The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Volume XVIII DECEMBER, 1945 Number 12

CURRENT EVENTS in the METAL INDUSTRY

Required Reading

NEW ALUMINUM ALLOYS containing small amounts of beryllium develop superior strength properties combined with high thermal stability and unusual oxidation-corrosion resistance. See Review of Current Metal Literature, Section 3 on Properties of Metals and Alloys, Item 3-206.

TRIBOELECTRIC EFFECT, observed through the electric current which is generated when two metallurgically dissimilar metals are caused to move in contact with each other, can be applied to sorting of steels and other alloys. Section 12 on Inspection and Standardization, Item 12-223. (See also New Products, Item R389.)

ELECTROLYTIC ZINC PLATING offers advantages over hot dipping of uniformity of finish and quality and more positive control of coating thicknesses; a zinc compound giving new advantages in the bath described. Section 8 on Electroplating, Item 8-131.

TEMPERING in the spot welding machine greatly improves mechanical properties of the weld, and makes it possible to join steels which would be unweldable using conventional methods of spot welding. Section 22 on Welding, Item 22-606.

DECREASE IN IMPACT ENERGY during tempering is caused by a precipitate which forms from solid solution as do precipitates which cause age hardening; suggested that precipitate may be iron nitride. Section 9 on Testing, Item 9-121.

HARDENABILITY calculated from composition by the factor method encounters difficulty when applied to steels that contain substantial amounts of a single element or to complex alloy steels. Section 9 on Testing, Item 9-127.

SILVER-THALLIUM ALLOY containing 2% thallium has excellent anti-friction properties, with extremely low rates of corrosion as compared with silver-lead or copper-lead alloys. Section 21 on Lubrication and Friction, Item 21-86.

PRESSURE TIGHTNESS of leaky bushings of gun metal, valve bronze and hydraulic bronze was improved when they were annealed for 3 hr. at 1200 to 1300° F. in an air or oxygen-rich atmosphere, but no sealing took place in a hydrogen atmosphere. Section 18 on Heat Treatment, Item 18-279.

WELDABILITY of magnesium-manganese alloys is impaired by the presence of cerium, added to improve mechanical properties; however, weld cracks can be completely eliminated by the addition of aluminum. Section 22 on Welding, Item 22-615.

THE CLASSIFICATION "alloy treated steels" should be revived, Henry Chandler believes, to accommodate the use of intensifiers, which should not be specified in the chemical analysis of a steel. Section 12 on Inspection and Standardization, Item 12-231.

WHERE TO FIND

Review of Current Metal Literature

Products and Processes

A STEEL-BACKED, LEAD BASE, BABBITT-LINED BEARING has an intermediate layer or matrix formed on the steel in a continuous strip process by sintering a mixture of pure copper and nickel powders to the steel strip. The pores of this matrix are then impregnated with the babbitt to form a chemical as well as mechanical bond. See New Products in Review, Item R385.

SPRAY GUN, designed for mechanical mounting and continuous operation, doubles previous spraying speeds by the use of $\frac{1}{16}$-in. wire, combined with an acetylene pressure of only 15 psi. Item R390.

SIXTY-CYCLE INDUCTION HEATER composed of standard resistance welding machine components is applied to heating suspension arm bores for the shrink fitting of serrated spindles, reducing time from 35 min. to 2½ min. per piece. Item R381.

SODIUM HYDRIDE PROCESS for descaling metals requires no electric current; scale, reduced by the sodium hydride, is blasted from the surface of the metal by the generation of steam in a subsequent water quench. Item R386.

Notable Lectures

AVIATION INDUSTRY expansion predicted by Dr. Furnas on basis of developments in radar, gas turbine, jet propulsion and the helicopter. (Page 3.)

BIAXIAL AND TRIAXIAL tension stresses caused by abrupt section changes are explained by Bain as cause of detrimental notch effects and brittle failures. Logical, he says, but so often forgotten. (Page 6.)

FATIGUE RESISTANCE is increased 80% by carburizing wrist pins on i.d. as well as o.d., Horger illustrates in talk on design and stress analysis. (Page 8.)

TRANSVERSE FLUX heating affords an efficient means for continuous annealing of fine wire and thin strip of nonferrous alloys—described publicly for the first time by Robert M. Baker. (Page 4.)

REACTION FORCES (result of the interaction between the grains of a metal) can account for most of the strength of an alloy, and actual grain size has little effect, Gensamer shows. (Page 6.)

Batcheller Speaks at Regional Dinner

Hiland G. Batcheller, president of the Allegheny Ludlum Steel Corp., strikes a humorous note in a serious dinner talk, climaxing a full-day technical session sponsored by the Regional Meeting Committee of the Pittsburgh Chapter. Left to right — F. W. Bremmer, past Chapter chairman; L. C. Whitney, past Chapter chairman; H. T. Clark, chairman, Regional Meeting Committee; L. W. Oswald, chairman, Pittsburgh Chapter; Hiland G. Batcheller; J. P. Gill, past national president and toastmaster; W. H. Eisenman, national secretary; and N. F. Tisdale, past national trustee.

Preview of Metal Congress Provided by Eight Papers At Pitt Regional Meeting

Reported by J. P. Bindyke
Heppenstall Company

Pittsburgh metals men enjoyed a most extraordinary treat when they attended a prehearing of a part of the technical program scheduled for the National Metal Congress to be held in Cleveland in February.

It all came about in a one-day technical meeting sponsored by the Regional Meeting Committee, headed by Harold T. Clark, Pittsburgh Chapter, with the assistance and approval of National Headquarters. Eight very excellent technical papers were presented in a manner reminiscent of National Metal Congress technique.

The technical speakers were E. S. Rowland and S. R. Lyle of Timken Roller Bearing Co.; J. W. Poynter of Army Air Forces, Wright Field; F. E. Bowman of Climax Molybdenum Co.; M. A. Hughes and J. G. Cutton of Carnegie-Illinois Steel Corp.; R. H. Harrington of General Electric Co.; W. A. Pennington of Carrier Corp.; J. H. Hollomon of Watertown Arsenal; W. T. Rogers of National Tube Co.

Lively, informal discussions, presided over by a number of past Chapter chairmen, resulted in a continued high interest throughout the morning and afternoon sessions. The high enthusiasm of this new type of program was carried over into the evening and climaxed in a pleasant, informal dinner. Hiland G. Batcheller, president of the Allegheny Ludlum Steel Corp., was the principal guest speaker of the evening.

Mr. Batcheller emphasized the degree to which cooperation among scientists, metallurgists and men of the metals industry contributed to the winning of the war. He hinted at ominous clouds threatening short life to one of the greatest war victories of all time, and, accordingly, stressed the need of continued effective cooperation, particularly as true American individuals, in order to insure a lasting healthy postwar era.

Guests in attendance from National Headquarters were W. H. Eisenman, national secretary, Ray T. Bayless, assistant secretary, and A. P. Ford.

High Temperature Metals Discussed

Reported by William McCrabb
Metallurgist, Inland Mfg. Div., G.M.C.

O. E. Harder, assistant director at Battelle Memorial Institute, has had a wealth of experience in the field of "Metals and Alloys for High Temperature Service", the subject he discussed at the first meeting of the season of the Dayton Chapter ASM. Dr. Harder accompanied his talk with projection slides, a number of which represented charts of data collected over a long period of time.

At the conclusion of the talk the meeting was thrown open to an informal discussion, which helped many of the members find answers to their own immediate problems.

PASS-A-ROUND

	Name	Item No.
Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention — and Pass-A-Round.		

METALLURGICAL CURRICULA

THE FOLLOWING list of educational institutions that have departments in metallurgy and offer degrees in that subject is supplementary to the list published in the September issue of THE METALS REVIEW. Reprints of the entire list are being made for distribution to high school seniors and students, and are available without cost upon request to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

University of Alberta, Edmonton, Alberta. (Prof. K. A. Clark.)
Degrees Available: B.Sc. in Mining Eng.
Courses Required Fourth Year: Phys. met.; extractive met. (Courses in met. are under the Dept. of Mining and Met. Chem. and mining eng. students are given an introduction to phys. and extractive met. in the senior year, ore dressing in the third and fourth years.)

University of British Columbia, Vancouver, B. C., Canada. (F. A. Forward, Head, Dept. of Met.)
Degrees Available: B.A.Sc.; M.A.Sc.
Courses Required Third Year: Eng.; mining; geol.; reduction & phys. met.
Courses Required Fourth Year: Math.; econ.; reduction met.; phys. met.; metallog.
Post-Graduate Work: Facilities for research and for full master's degree work.

University of Cincinnati, Cincinnati 21, Ohio. (R. S. Tour, Head, Dept. of Chem. and Met. Eng.)
Degrees Available: B.S. Met.E.; Met.E.; M.S.; Ph.D. (Curriculum at the University of Cincinnati is offered on cooperative basis requiring 5 years of 11 months each for completion. The 1st, 2nd, and 3rd years of Met.E. is common with that of Ch.E.)
Courses Required Fourth Year: Theories of met.; heat treat. lab.; heat treat.; metallog. methods; extraction met.; met. fabrication; met. fabrication lab.; chem. eng. thermodynamics; library practice; unit operations; chem. eng. operations lab.; str. of matls.; mech. eng. lab.; prin. of econ.; English.
Courses Required Fifth Year: Electromet.; met. eng. design; met. eng. res.; inspection trips; chem. eng. kinetics; indus. lectures; elect. lab.; elec. eng.; atomic structure; electives; English.
Post-Graduate Work: Grad. assistantships and fellowships are available for students qualified for grad. study in met. For the M.S. degree, 24 credits plus a thesis are required, while 72 credit hours are required for the Doctorate. Students are required to submit a thesis and pass written and oral examinations for Ph.D.

Laval University, Dept. of Mining & Metallurgy, Quebec, Canada. (G. Letendre, Director.)
Degrees Available: B.A.Sc. in Met. Eng.; M.Sc. Met.; D.Sc. Met.
Courses Required Third Year: Elemen. met.; met. iron & steel; ore dressing; metallog.; phys. chem.; elements elec. eng.; elements mech. eng.; str. of matls.; eng. repts.; mining eng.
Courses Required Fourth Year: Met.; metallog.; electromet.; met. problems & design; ore dressing; app. thermochem.; econ.; eng. law; struct. design.
Post-Graduate Work: Phys. met.; process met.; and mineral dressing leading to above-mentioned degrees. Fellowships available for research students.

Michigan State College, School of Engineering, Department of Chemical and Metallurgical Engineering, East Lansing, Michigan. (Dr. C. C. DeWitt, Head, Dept. of Chem. & Met. Eng.)
Degrees Available: B.S. in Met. Engr.; Met. Engr. (five years); M.S.; Ph.D.
Courses Required Third Year: Phys. chem.; mech.; prin. of phys. met.; diff. equations; machine shop; elec. eng. a.c. & d.c.: matls. test. lab.; metallographic instr.; fuel eng.; social sci. or lit. & fine arts; adv. military sci. R.O.T.C.
Courses Required Fourth Year: Unit operations; pyrom.; fer. met.; non-fer. met.; steel & alloy anal.; met. calc.; indus. management; fer. metallog.; nonfer. metallog.; metallog. alloy steels; thermodynamics; tech. elective as math., shops, geol. investigative problem; seminar; adv. military sci. R.O.T.C.
Post-Graduate Work: The necessary facilities are available for advanced study and thesis work in phys. met. and metallog. leading to degrees M.S. and Ph.D., major in met. eng. A limited number of half-time graduate assistantships are available.

University of Michigan, Ann Arbor, Mich. (Prof. G. G. Brown, Chairman, Dept. of Chem. and Met. Eng.)
Degrees Available: B.S.E. (Met. Eng.); M.S. (Met. Eng.); Met. Engr.; Ph.D.; D.Sc. (Met. Eng.)
Courses Required Third Year: Mech.; eng. calc.; heat engines; org. chem.; phys. chem.; thermodynamics; measurements lab.; structure of solids; foundry; unit operations.
Courses Required Fourth Year: Phys. chem.; phys. met.; met. process design; eng. lab. and design; X-rays; elec. eng.; econ.; accounting; English; electives.
Post-Graduate Work: Excellent facilities for work leading to the M.S. and Ph.D. or D.Sc. degrees.

Polytechnic Institute of Brooklyn, 85 Livingston St., Brooklyn 2, N. Y. (Dean Ernest J. Streubel.)
Degrees Available: B. Met. Eng.
Courses Required Third Year: Elem. phys. chem.; mech. of matls.; prin. of elec. eng.; language or hist.; micros.; prop. eng. matls.; chem. micros.; electromet.; alloy steel metallog.; light alloys metallog.; mach. elements; indus. inspection; indus. management.
Courses Required Fourth Year: Mineralogy; tech. writing; intro. to econ.; metallog. Cu alloys; indus. met.; welding & design; thermodynamics; elem. of struc.; thesis; senior option.

State College of Washington, School of Mines and Geology, Pullman, Washington. (F. W. Schonfeld, Asst. Prof. of Physical Metallurgy.)
Degrees Available: B.S. and M.S. in Met. Eng.; B.S. and M.S. in Phys. Met.
Courses Required Third Year (Metallurgical Engineering): Mineral dressing; fuels & refractories; phys. chem.; report writing; eng. mech.; mineral dressing lab.; non-fer. met.; mech. of matls.; met. inspection; quant. anal.
Courses Required Fourth Year (Metallurgical Engineering): Fire assaying; met. design; fer. met.; met. lab.; metallog.; met. calc.; electromet.; hydraulics; contracts and spec.; met. res.
Courses Required Third Year (Physical Metallurgy): Eng. mech.; phys. chem.; metallog.; fer. met.; non-fer. met.; mech. of matls.; heat treat.
Courses Required Fourth Year (Physical Metallurgy): Alloy steels; fuels and refrac.; welding res.; adv. metallog.; electromet.; optics; X-ray.

Stevens Institute of Technology, Hoboken, N. J. (Alfred Bornemann, Assoc. Prof. of Engineering Chemistry.)
Degrees Available: B.S.; M.S.; Mech. Engr.
Courses Required: Mechanical Engineering degree requires a term's course in phys. met.
Post-Graduate Work: Courses leading to B.S. or M.S. degree with concentration in phys. met., indus. chem., powder met., and others. Evening courses are held leading to these degrees. Evening classes are available in metals; met. lab.; powder met.; powder met. lab.; metallog. of light alloys; alloy steels; powder met. res.; production met.; phys. met. res.

University of Washington, College of Mines, Seattle 5, Wash. (Milnor Roberts, Dean.)
Degrees Available: B.S. and M.S. in Met. Eng.; Prof. degree of Met. Engr.
Courses Required Third Year: Fire assaying; non-fer. met.; milling; mech.; fuel tech.; wet assaying; direct and alternating currents; met. lab.; field excursion; general econ.
Courses Required Fourth Year: Met. iron and steel; phys. met.; metallog.; met. calc.; phys. chem.; advanced nonfer. met.; field excursion; mining eng.; mineral dressing; econ.; thesis.
Post-Graduate Work: Advanced courses and research investigations open to holders of bachelor's degrees. Some fellowships available. Only master's degree in met. eng. offered.

Wayne University, Detroit, Michigan. (Arthur R. Carr, Dean, College of Engineering.)
Degree Available: B.S. in Met. Eng.
Courses Required Third Year: Org. chem.; phys. chem.; unit operations; non-fer. metallog.; adv. fer. metallog.; fer. met.; non-fer. met.; pyrom.; str. of matls. plus lab.
Courses Required Fourth Year: Chem. eng. thermodynamics; special problems plus lab.; econ.; English; speech; d.c. & a.c. circ. and machinery; mech. sketching and drafting room prac.

University of Wisconsin, College of Engineering, Department of Metallurgy, Madison, Wis. (G. J. Barker, Chairman, Dept. Mining and Met.)
Degrees Available: B.S. in Met. Eng; M.S. in Met. Eng.; Ph.D. in Met. Eng.
Courses Required Third Year: Met. of iron and steel; phys. chem.; met. of copper, lead, zinc; mech.; metallog.
Courses Required Fourth Year: Heat treat.; alloy structures; foundry; met. calc.; X-ray; elec. eng.
Post-Graduate Work: Research laboratories available for all types of research. 24 credit hours plus thesis.

Tatnall Entertained at Dayton

In the cocktail lounge just prior to the October meeting of the Dayton Chapter ASM are seen (left to right): Stewart DePoy, Chapter treasurer; Lt. Com. H. J. Huester; F. G. Tatnall, speaker of the evening; Lawrence Jaffe, Chapter chairman; Ned L. Langer; Chester L. Gillum, secretary; and William McCrabb and Joseph D. Loveley. Mr. Tatnall's lecture on "Experimental Stress Analysis" has been previously reported.

Strength Increased by Putting Surface of Material in Compression

Reported by G. F. Kappelt
Assistant Metallurgist, Bell Aircraft Corp.

J. O. Almen of General Motors Research Laboratory demonstrated to the members of the Buffalo Chapter at its October meeting the benefit that can be derived from residual stresses in materials.

In his lecture, aided by slides and actual demonstrations, Mr. Almen showed that the apparent strength of a member can be increased markedly by putting the surface of the material in compression. According to him, many of the benefits derived from such treatments as carburizing and nitriding are due to the fact that such processes put the surface in compression. He stated further that the results obtained from the common methods of testing materials lead to an erroneous evaluation of their properties.

These remarks revolved around Mr. Almen's theory that the fatigue life of practically any dynamically loaded member can be improved by judicious shot peening.

Methods Outlined for Control of Arc Blow In Electric Welding

Reported by F. G. Wayman
Chemist, The Steel Co. of Canada, Ltd.

"Electric Arc Welding and Its Application" was the subject of the opening meeting of the Montreal Chapter ASM. Gordon Cape, methods and research engineer at Dominion Bridge Co., Ltd., was the speaker.

The electric arc is particularly suitable as a source of energy for welding because of its highly and effectively concentrated heat; temperatures are approximately 8500° F. for carbon arc and 6000° F. for metallic. Although maximum heat is developed at the positive terminal in the case of the bare electrode arc, the reverse may be true for covered electrodes due to the ionizing characteristics of certain types of coatings.

Welding machines may be either direct current or alternating current. The greatest single advantage possessed by a.c. welding machines is the almost complete absence of arc blow.

When current flows in a welding circuit, it chooses the path of least resistance between ground terminal and arc. The magnetic field surrounding the path of the current flow is more concentrated on one side of the arc because of the sharp change in direction in the path from ground to arc and into the electrode. As a result the arc is driven away from the area of high magnetic flux.

In welding a seam, a strong blow exists toward the center of the plate; as the seam is completed, the arc blow becomes progressively neutral and then reverses its direction. This reversal of direction is caused by the loss of magnetic properties when the temperature of the metal exceeds about 1350° F.

Arc blow can be controlled by several methods, such as tilting the electrode; positioning of the ground; insulating one end of the work; completing magnetic circuit by tacking of ends and welding of tabs; use of magnetic backing bars or U-bars.

All mild steel covered electrodes fit into three main groups in the E-6000 series in the American Welding Society designations. Electrodes for welding material higher in tensile strength are designated as the E-7000 series. The weld metal produced is approximately 10,000 psi. greater in tensile strength than with the E-6000 series.

Regional Meeting Climaxed by Jominy's Woodside Lecture

Reported by M. F. Garwood
Metallurgist, Chrysler Corp.

A "Regional Metals Conference" climaxed by the third annual Woodside Memorial Lecture initiated the year's technical sessions of the Detroit Chapter ASM. This conference was held to permit an oral presentation and discussion of the latest technical information delayed by postponement of the annual convention. The presence of W. H. Eisenman, national secretary, and Ray T. Bayless, assistant secretary, contributed much to the success of the meeting. After the dinner Mr. Eisenman announced the coming convention and briefly discussed its scope and necessity.

The conference program consisted of 13 papers which were given in two simultaneous sessions and lasted from 9:30 a.m. until 5:00 p.m. Presentation of these papers will be repeated at the National Metal Congress in Cleveland in February.

W. E. Jominy culminated the day's activities with the presentation of the Woodside Lecture on "Developments in Aircraft Metallurgy Since World War I". In his position as chief metallurgist of the Dodge Chicago Division of the Chrysler Corp., which manufactured engines for the B-29 bombers, Mr. Jominy was capable of vividly contrasting these engines with the old Liberty engine of World War I with which he was well acquainted.

The present aircraft engines contain 18 new materials and incorporate the development of 10 new processes, Mr. Jominy stated. Applications of the various new metals and processes were discussed in some detail. The use of magnesium, forged aluminum, beryllium, and silver-lead-indium bearings was particularly enlightening.

Correlation in Metallurgical Control Explained by Math Professor

Reported by Theodore J. Russell
International Harvester Co.

Correlation as an aid in metallurgical control was explained by Irving W. Burr, associate professor of mathematics, Purdue University, addressing the Oct. 11th meeting of the Chicago Chapter.

Mr. Burr described the calculation and use of the correlation coefficient in determining the strength of relationship between measurable variables and the prime or quality variable. He used typical data on the production of steel to illustrate the effect of variables such as analysis, pouring temperature, sealing time, and pit time on a prime variable—the tons of steel rejected because of surface imperfections.

He characterized the correlation method as a "sharp tool" capable of yielding much better results than acting on "hunches" or "by-guess and by-gosh".

Shot Peening, Changing Analysis or Design Improves Fatigue Life

Reported by Thomas Clark
Sales Engineer, Park Chemical Co.

A record attendance enjoyed the innovation of holding the November meeting of the Chicago Chapter at the Museum of Science and Industry. "Fifty Years of Automobile Progress", featuring a display from the birth of the "horseless-buggy" to the new 1946 models, was the most popular exhibit.

Highlight of the evening was the presentation by O. J. Horger, chief engineer, Railway Division, Timken Roller Bearing Co., on "Modern Design—Stress Analysis—Metallurgical Concepts". Opening his talk with the statement that design engineers and metallurgists are mutually dependent on each other and must work together, he showed how it is frequently possible to retain the original dimensions of a part and still increase its resistance to failure by the addition of a single operation in processing.

Dr. Horger's research is unique in that practically all tests are made on production parts and because of the service demanded of railroad axles, they are subjected to 85,000,000 cycles which require approximately four months to complete.

He mentioned four variables causing fatigue failures: *(a)* Surface condition, *(b)* material, *(c)* shape, and *(d)* residual stresses. He told how shot peening "as-forged" axle surfaces and rolling fillets with a burnishing tool has in some cases as much as doubled resistance to fatigue failure. Substituting steels of different analysis also gave worthwhile improvements. Where premature failure was caused by the lines of stress being broken by an oil hole, a small indentation on each side of the hole along the length of the axle diverted the stresses and improved the life of the part.

Dr. Horger illustrated fatigue failures in wrist pins, showing how fatigue strength is influenced by various heat treating procedures. Carburizing chromium-nickel-molybdenum pins on the inside diameter to the same depth as on the outside diameter increased fatigue resistance 80% over similar pins not case carburized on the inside.

Dr. Horger concluded his talk by pointing out the need for reference tables which would give the design engineer the data necessary to get the best material for a given part. The metallurgist, he said, can make an important contribution to this goal by working with the designer.

During the discussion period that followed, Prof. H. F. Moore, research professor of engineering materials, emeritus, University of Illinois, and a pioneer in the field of stress analysis, was asked to comment on Dr. Horger's talk. He concurred in all that the latter had said, but stated that he believes relatively accurate predictions can also be made with small test specimens. He also mentioned the field of testing where cycles are at a minimum as in bridge members and railroad rails.

Martempering Removes Hazards By Equalizing Cooling Rates

Reported by A. J. Newsom
Schwitzer-Cummins Co.

R. B. Seger, works manager of Lindberg Steel Treating Co., opened a discussion on "Martempering" before the Indianapolis Chapter by pointing out that cracking often occurs when volumetric changes which take place during the transformation of austenite to martensite do not occur simultaneously. Martempering has removed a great deal of this hazard because the parts are quenched in a bath and held at a uniform temperature slightly above the point at which transformation begins so that the cooling rate of unequal sections is almost parallel.

However, martempering cannot be utilized on all types of steel, and very often the heat treater receives steel which will not reach the maximum hardness by quenching into a hot bath. By the correct interpretation of the S-curve these steels can be hardened so that transformation will occur almost simultaneously. This can be accomplished by quenching in the proper medium to get below the knee of the S-curve in the allotted time and then transferring to an elevated temperature bath which is above the point of transformation. The parts are allowed to remain there until all sections become uniform in temperature. They may then be removed and air cooled.

Martempering is beneficial in the prevention of microcracks, thereby increasing the fatigue life. It is important that parts be free of scale when quenching in an elevated bath because scale has a tendency to reduce the cooling rate of the steel.

Mehl Tells of Metallurgical Travels

Reported by H. S. Lewis
International Nickel Co.

"World Wide Metallurgy" was the subject presented by Prof. Robert F. Mehl of Carnegie Institute of Technology before the New York Chapter, ASM, on Nov. 5. Professor Mehl discussed the status of metallurgical progress and activity in countries which he has visited in the past year in connection with his work on the War Metallurgy Committee, and showed some interesting slides of both scenery and plant equipment in Brazil, England, France and Germany. His talk was reported in detail in the November issue of THE METALS REVIEW, page 5.

Appointments to A.S.M. Standing Committees


C. T. Evans, Jr.


J. O. Lord


H. K. Work


G. V. Luerssen


R. M. Brick


R. F. Mehl

A.S.M. National Committee Chairmen

At the meeting of the Board of Trustees of the American Society for Metals held Nov. 2, new appointments to the various national committees of the Society were announced by President Van Horn and confirmed by the Board. The complete personnel of the standing committees is listed below. The new appointments are shown in italics and the numerals represent the date of expiration of membership.

Constitution & By-Laws Committee

C. T. Evans, Jr., Elliott Co., Jeannette, Pa., '46, Chairman.
D. D. Beach, Atlanta Gas Light Co., Atlanta, Ga., '48.
Rea Hahn, Rochester Products Div., G.M.C., Rochester, '47.
Richard F. Harvey, Brown & Sharpe Mfg. Co., Providence, R. I., '48.
Melville D. Johnson, Graham-Paige Motors Corp., Detroit, '47.
A. L. Boegehold—Representative of ASM Board of Trustees.

Educational Committee

J. O. Lord, Ohio State University, Columbus, Ohio, '46, Chairman.
Ray T. Bayless, ASM, Cleveland, Secretary.
C. R. Austin, Meehanite Research Institute of America, Inc., New Rochelle, N. Y., '47.
J. E. Dorn, University of California, Berkeley, Calif., '48.
G. R. Fitterer, University of Pittsburgh, '48.
W. D. McMillan, International Harvester Co., Chicago, '46.
H. B. Pulsifer, American Metal Treating Co., Cleveland, '48.
C. H. Shapiro, Reed Roller Bit Co., Houston, Texas, '46.
C. G. Stephens, Glenn L. Martin Co., Baltimore, Md., '47.
Robert Stout, Lehigh University, Bethlehem, Pa., '48.

Finance Committee

H. K. Work, Jones & Laughlin Steel Corp., Pittsburgh, Chairman.
L. E. Ekholm, Alan Wood Steel Co., Conshohocken, Pa., '48.
Zay Jeffries, General Electric Co., Pittsfield, Mass., '47.
H. D. McKinney, Driver-Harris Co., Harrison, N. J., '46.
N. P. Petersen, Canadian Acme Screw & Gear Ltd., Toronto, '47.
G. E. Stoll, Bendix Corp., South Bend, Ind., '47.
Clyde Williams, Battelle Memorial Institute, Columbus, Ohio, '48.
K. R. Van Horn, Cleveland, Consultant.

Metals Handbook Committee

G. V. Luerssen, Carpenter Steel Co., Reading, Pa., '46, Chairman.
Taylor Lyman, ASM, Cleveland, Secretary.
Earnshaw Cook, Tuxedo, N. Y., '48.
A. J. Herzig, Climax Molybdenum Co., Detroit, '46.
J. B. Johnson, Wright Field, Dayton, Ohio, '46.
J. J. Kanter, Crane Co., Chicago, '46.
C. H. Lorig, Battelle Memorial Institute, Columbus, Ohio, '46.
H. W. McQuaid, Republic Steel Corp., Cleveland, '46.
H. S. Rawdon, Bureau of Standards, Washington, '47.
N. E. Woldman, Bendix Aviation Co., Teterboro, N. J., '48.
Lyall Zickrick, A.I.M.E. Rept.
H. L. Maxwell, A.W.S. Rept.
C. W. Obert, I.A.A. Rept.
J. H. Romann, A.S.M.E. Rept.

Metal Progress Advisory Committee

E. E. Thum, Editor, Metal Progress, Cleveland.
C. H. Herty, Jr., President ASM.
A. L. Boegehold, Vice-President ASM.
W. H. Eisenman, Secretary ASM.
Ray T. Bayless, Assistant Secretary ASM.
E. H. Dix, Jr., Aluminum Co. of America, Pittsburgh, '48.
H. L. Edsall, Radio Corp. of America, Philadelphia, '47.
Zay Jeffries, General Electric Co., Pittsfield, Mass., '47.
Earle Smith, Republic Steel Corp., Cleveland, '48.
C. H. Stevenson, Lindberg Engineering Co., Chicago, '46.
C. E. Swartz, R.F.D. No. 3, Chagrin Falls, Ohio, '46.
F. G. Tatnall, Baldwin-Southwark Div., Philadelphia, '46.

Publications Committee

R. M. Brick, Towne Scientific School, University of Pennsylvania, Philadelphia, '46, Chairman.
Ray T. Bayless, ASM, Cleveland, Secretary.
R. H. Aborn, U. S. Steel Corp., Kearny, N. J., '48.
R. E. Cramer, University of Illinois, Urbana, Ill., '46.
H. I. Dixon, Sterling Alloys Co., Woburn, Mass., '47.
A. L. Feild, Rustless Iron & Steel Corp., Baltimore, Md., '48.
R. P. Koehring, Moraine Products Co., Dayton, Ohio, '47.
H. B. Osborn, Jr., Ohio Crankshaft Co., Cleveland, '48.
R. W. Roush, Timken-Detroit Axle Co., Detroit, '46.
E. S. Rowland, Timken Roller Bearing Co., Canton, Ohio, '48.
A. O. Schaefer, Midvale Co., Nicetown, Philadelphia, '46.
G. A. Sellers, Boeing Aircraft Co., Wichita, Kansas, '47.
Gordon Sproule, McGill University, Montreal, '47.
R. L. Templin, Aluminum Co. of America, New Kensington, Pa., '47.
H. S. Van Vleet, American Can Co., Maywood, Ill., '48.
B. B. Wescott, Gulf Research & Development Corp., Pittsburgh, '46.

Metallurgical Education Advisory Committee

R. F. Mehl, Carnegie Institute of Technology, Pittsburgh, Chairman.
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C. B. Carpenter, Colorado School of Mines, Golden, Colo.
John Christie, Handy & Harman, Bridgeport, Conn.
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Bradley Stoughton, Lehigh University, Bethlehem, Pa.
R. S. Williams, Massachusetts Institute of Technology, Cambridge.
R. E. Zimmerman, United States Steel Corp., Pittsburgh.

Radar, Gas Turbine, Jet Propulsion, Helicopter Point Future Trends in Aviation Development

Reported by Henry Hubbell
The Fafnir Bearing Co.

An insight into the future of the aviation industry was provided by Clifford C. Furnas, director of research, Curtiss-Wright Airplane Division, for the Hartford Chapter on Oct. 9.

Dr. Furnas named four developments that will be of primary importance to the future of the aviation industry. They are: (1) Radar, which will enable commercial air lines to approach all-weather operation; (2) the gas turbine, which will obsolete, in Dr. Furnas's opinion, reciprocating engines over 1000 hp., combining light weight with efficiency; (3) jet propulsion, which will make higher altitudes and speed possible, and (4) the Helicopter, which has the utmost versatility—control at zero velocity.

Forecasts made in 1944 for 1950 indicated that only 575 transport planes would be needed for passenger, mail and cargo services in the United States. Private planes will still be comparable to sailboats, and they will not be like the automobile, a means of "getting from here to there". This is not a very bright outlook for the aviation industry as we have known it under the stimulus of war.

Moreover, the military planes we now have are obsolete. The uninhabited plane, such as the German V-1, and the rocket projectile, such as the V-2, are previews of military aviation of the future. Germany was developing 131 such missiles at the close of the war. The airplane and the projectile are drawing together to become a guided or self-seeking missile. Add to this the atomic bomb, and the implication is incomprehensible.

Dr. Furnas emphasized, however, that new industries always expand more rapidly than anticipated in conservative estimates and that the four developments mentioned above will undoubtedly stimulate much greater use of commercial aircraft than indicated by the figure of 575 airplanes.

The questions centered chiefly around the atomic bomb. When asked about the defense against it, Dr. Furnas pointed out that no one had yet stopped an artillery shell once it had started, and that only one atomic projectile need reach its destination to accomplish complete destruction.

Concerning the efficiency of this new method of energy release, he said that energy from one pound of uranium, if its use were 100% efficient, would send a large flying boat around the world five times without refueling. The difficulty at present is that there is no means of absorbing atomic energy as a boiler absorbs the energy of ordinary combustion.

Interrupted Quenching Discussed

Reported by Stewart M. Grant
Laboratory Supervisor, W. S. Tyler Co.

Cleveland Chapter ASM opened its 1945-46 season on Oct. 1 with an excellent talk by Arnold P. Seasholtz, consulting metallurgist of the Seasholtz Metallurgical Service. His talk on "Conventional Vs. Interrupted Quenching in Heat Treatment of Steel" has been reviewed previously in THE METALS REVIEW and was published in the October 1944 issue of METAL PROGRESS.

A lively discussion period followed with Mr. Seasholtz stressing the fact that although the interrupted quench and salt bath have some distinct advantages in improving the physical properties there still is room for improvement.

The Metals REVIEW
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Ray T. Bayless .... *Editor*
M. R. Hyslop .... *Managing Editor*

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Volume XVIII Number 12

Compliments

To BRIDGEPORT BRASS Co. on the completion of its first 80 years, during which time it pioneered in the manufacture of tubes, telephone wire, electric furnace melting, and in the application of science to brass manufacture—also for the receipt, during World Wars I and II, of every possible Army-Navy "E".

To SQUADRON LEADER M. S. LAYTON, a member of the Montreal Chapter ASM, on the award of the Distinguished Service Order for his part in the war.

To the HARSHAW CHEMICAL Co. of Cleveland, on the receipt of the only four-star Army-Navy "E" flag to be awarded in the state of Ohio by the Manhattan Engineer District, in recognition of the work done by the company on chemicals essential to the atomic bomb. Also to C. F. ROBISON of Harshaw's electroplating division on the award of a key by the Kellex Corp. in recognition of professional and personal contributions to the atomic bomb project.

To LEON C. BIBBER, welding engineer for the Carnegie-Illinois Steel Corp., on the award of the Lincoln Gold Medal and Certificate of the American Welding Society for the best paper published in the *Welding Journal.*

To H. C. BOARDMAN, research engineer, Chicago Bridge and Iron Co., and DAVID S. JACOBUS, retired, on the receipt of honorary memberships in the American Welding Society.

To EDWARD C. HOENICKE, general manager of the Foundry Division, Eaton Mfg. Co.; FRANK G. STEINEBACH, editor of *Foundry;* DONALD J. REESE, head of the iron and non-ferrous castings section, development and research division, International Nickel Co.; and others on the award of "Tribute of Appreciation" certificates by the Gray Iron Founders' Society for distinguished service to the Government and the gray iron foundry industry during the war.

At Home We Call It Garbage

In France they call it food! Reports from France are unanimous and emphatic that the winter will bring terrible privation and suffering to innocent people. Ask The Metals Review to give you the name of a French compatriot and hints about sending monthly food and clothing packages that literally will mean a happy New Year.

Inland Empire Has New Officers

With RFC's cancellation of the lease of the Aluminum Co. of America's plant at Spokane, Wash., the Inland Empire Chapter of the ASM has lost two of its important officers and many members. C. S. Mercer has resigned as chairman of the Chapter to move to New Kensington, Pa., in the sales division of the Aluminum Co. Vice-Chairman J. K. Mullen, branch manager of General Electric X-Ray Corp., now becomes Chapter chairman.

Also resigning is Walter Davis, who was secretary-treasurer. Don Walters, manager of Inland Empire Industrial Research, Inc., has been appointed new secretary-treasurer.

Alcoa Names Kempf Assistant Research Director

Louis W. Kempf has been named assistant director of research of the Aluminum Research Laboratories, Aluminum Co. of America. Mr. Kempf, who has been with the Aluminum Co. since 1924 and for many years has been manager of the Cleveland Research Division, will divide his time between New Kensington, Pa., where the main laboratory is located, and the Cleveland division. He has long been active in the Cleveland Chapter ASM and is a past chairman of the Society's Publications Committee. He is currently chairman of the Institute of Metals Division of the AIME.


L. W. Kempf

Succeeding Mr. Kempf as manager of the Cleveland Research Division is Kent R. Van Horn, who has been assistant manager since 1944. Dr. Van Horn has just completed a term as president of the ASM and is also president of the American Industrial Radium & X-Ray Society. His assistant in the Cleveland territory will be Maurice W. Daugherty, formerly a research chemist in the Cleveland Alcoa laboratories.


K. R. Van Horn

Germany Relied on Carbides, 3-3-3 Tool Steel Says Gill

Reported by Willard R. Sweet
Tool Engineering Dept., International Business Machines Co.

The various high speed steel alloys available before and during the war and their advantages and disadvantages were thoroughly reviewed by James P. Gill, vice-president, Vanadium-Alloys Steel Co. and a former national president of ASM. Mr. Gill spoke on "High Speed Steels" before a joint meeting of the ASM and the Elmira Chapter of the American Society of Tool Engineers.

He emphasized that some of the moly steels, brought out because of wartime shortages, have proved so satisfactory that they will be used extensively postwar.

Grain size of high speed steel greatly affects its toughness. Mr. Gill's proof of this statement lay in results of tests of heat treated specimens, subjected to static torsion loads. The effect of carbide distribution on grain size and toughness was also discussed.

Mr. Gill recommended the nitriding of small taps, reamers, and chasers made of high speed steels, but pointed out that generally no advantage accrues from the nitriding of large cutting tools.

Considerable time was devoted to a discussion of the research work done in determining the effect of sub-zero treatment on high speed steels. The speaker can find no reliable evidence that sub-zero treatment of properly hardened and tempered high speed steels produces any metallurgical change.

In discussing his trip to Germany this summer, Mr. Gill noted that Germany had many substitute alloy cutting steels, but she depended mostly on carbides for production cutting tools. Their 3-3-3, "holy trinity", tool steel was extensively applied in small taps and reamers, but was not considered as satisfactory as high speed, according to reports given him by German small tool manufacturers who had to use this material.

Plating, Shot Peening, Design Covered in Talk on Springs

Reported by John M. Sherry
Metallurgist, Warner Gear Div.

A talk on "Springs and Spring Materials" by J. R. Gustafson, chief engineer of the Muehlhausen Spring Corp., Logansport, Ind., opened the fall meetings of the Muncie Chapter on Oct. 9.

Mr. Gustafson traced the history of the spring, beginning with the bow. The first coil springs were made about 1710, and the clock spring industry was one of New England's first. Hard drawn wire was an outgrowth of the Civil War, and alloy steel springs of World War I.

Spring materials today come under a variety of headings such as clock spring steel, flat spring steel, hot-rolled steel, silicon-manganese steel, oil-tempered wire, hard drawn wire, music wire, stainless steels and several non-ferrous compositions.

When steel springs must be plated, cadmium has the advantage of speed and less likelihood of hydrogen embrittlement when conditions are carefully controlled. Mechanical cleaning prior to plating is preferable to chemical cleaning and current density is very critical.

Shot peening will raise the fatigue endurance stress range of steel springs by approximately 18%. Compression springs are the most efficient in terms of energy that can be absorbed per unit weight of material; flat springs least efficient. According to Mr. Gustafson, many designers fail to provide sufficient space for a spring of a size to do the job, thereby placing a ceiling on the energy that can be absorbed by a spring regardless of its design. Resultant overloading of the spring leads to early failure in service.

Transverse Flux for Heating Non-Ferrous Strip Discussed Publicly for First Time

Reported by R. P. Nevers
Chemist, American Brass Co.

The use of transverse flux for the heating of non-ferrous strip was discussed publicly for the first time by Robert M. Baker, section engineer, Industrial Electronics Division, Westinghouse Electric Corp., before the New Haven Chapter on Oct. 25. Mr. Baker's subject was "Induction Heating of Non-Ferrous Metals and Alloys".

Before discussing the new method of transverse flux heating, Mr. Baker reviewed the conventional method of induction heating with longitudinal flux. It was pointed out that rods or plates greater than ¼ in. diameter or thickness can be heated practically by the conventional method using power from rotating machines. Smaller sizes require higher frequencies from oscillator equipments, and, because of the small size, the efficiency of heating is poor. Thus, whereas the conventional method of induction heating is applicable to heating for forging, soldering, brazing and many other applications, it becomes impractical for the continuous annealing of fine wires and thin strips of non-ferrous metals or alloys.

The method of transverse flux heating, however, affords an efficient means for heating thin non-ferrous strip in a continuous line process. In this process magnetizing coils are arranged on laminated iron pole structures located on both sides of the strip. High frequency power is supplied to the coils from rotating machines. The frequency used depends principally on the thickness of strip to be heated. Thin strips (0.002 to 0.006 in. thick) require a frequency of 3000 cycles per sec.

A pilot line installation for annealing aluminum strip 54 in. wide and 0.04 in. thick at a speed of 30 ft. per min. was shown. Because of the heavy gage strip this installation operated directly off the 60-cycle power system with a power input of 350 kw. Annealing speeds of several hundred feet per minute can be realized.

By proper adjustment, the same pole structure can be used to heat strips of different thickness if the variation in thickness is not greater than three to one. Thus a pole structure designed to heat 0.020-in. brass strip will heat strip from 0.010 to 0.030 in. thick.

It is desirable to weld the front end of one roll of strip to the tail end of another to keep a uniform flow of strip through the pole structure. This is now standard practice in the steel industry where induction heating is used to flow or brighten electrolytic tin-plate.

Gold Buttons Commemorating 25-Year Memberships Available

With the celebration of the silver anniversary of a good many chapters of the American Society for Metals during the past two years, it has been found that an ever-increasing number of members have participated in the affairs of the Society for a period of 25 years or more. This long period of cooperation with the ASM and the metal industry is now being recognized in the form of a "Twenty-Five-Year Button".

As shown in the illustration at the left, it is a handsome solid gold button with the numerals "25" in gold on a white enamel background and the "American Society for Metals" at the bottom also in gold letters on a blue background. The buttons are available at the cost price of $4.00 to those who have been members of the Society for a period of 25 years or longer, and may be ordered from the national headquarters in Cleveland.

Electrolytic Manganese, Chromium, Titanium Compared to Common Alloys

Reported by J. H. Cox
Missouri School of Mines

Development work of the U. S. Bureau of Mines on alloys other than those of the common base metals was outlined on Sept. 26 before the Missouri School of Mines Chapter of the ASM. R. S. Dean, assistant director of the Bureau of Mines and a graduate of the class of 1915 of Missouri School of Mines, was the speaker.

Dr. Dean spoke mainly about electrolytic manganese, chromium and titanium. He gave their physical characteristics and relative properties in comparison with more common alloys of like nature, often to the benefit of the former. Manganese, he said, is in production today as a base for alloys, chromium is approaching a production state for the same purpose, while titanium is still in the laboratory stage.

Two Corrections, Please!

The October issue of THE METALS REVIEW erroneously stated that Robert S. Rose, who was appointed district sales manager of the Boston office of Latrobe Electric Steel Co., was a past chairman of the Boston Chapter ASM. The statement should have read that he was a past chairman of the Springfield Chapter (1934-35).

Also in the October issue appeared a story about the heat treating curriculum of the Hartford Trade School. The article was credited to W. P. Eddy, Jr., but should have appeared over the signature of W. E. Bancroft, chief metallurgist of Pratt & Whitney Division, Niles-Bement-Pond Co. R. J. Haigis and W. W. Wight also collaborated in the preparation of the story.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Jan. 21		B. W. Gonser	Recent Advances in Non-Ferrous Metallurgy
Birmingham District	Jan. 8	Thos. Jefferson Hotel	W. A. Lazier	Research in Action
Boston	Jan. 4	Hotel Sheraton	Edgar C. Bain	Sauveur Memorial Lecture
Calumet	Jan. 8	Peter Levant's, Roby, Ind.	Scott B. Ritchie	U. S. Army Equipment Compared with Nazi Equipment
Canton	Jan. 17		Scott B. Ritchie	Metallurgy of Captured Enemy Ordnance Equipment
Cedar Rapids	Jan. 8	Hotel Roosevelt	Claire Balke	Powdered Metal
Chicago	Jan. 10	Chicago Bar Assoc.	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Cleveland	Jan. 7	Cleveland Club	E. G. deCoriolis	Furnace Atmosphere
Columbus	Jan. 8	Fort Hayes Hotel	R. L. Templin	Mechanical Testing
Dayton	Jan. 9	Engineers' Club	L. S. Bergen	Precision Casting
Detroit	Jan. 14		Floyd E. Harris	Carbon Restoration and Furnace Atmospheres
Georgia	Jan. 7	Piedmont Hotel	Otis E. Grant	Magnesium
Hartford	Jan. 8	Hartford State Trade School	E. S. Davenport	Isothermal Transformation
Indianapolis	Jan. 21		R. F. Mehl	Impressions of World-Wide Metallurgy
Los Angeles	Jan. 24	Southern California Gas Co.		Cold Finishing of Steels
Louisville	Jan. 18	Seagram's Auditorium		Chapter Party
Mahoning Valley	Jan. 9	Youngstown Alloy Casting Co.	Jack Trantin, Jr.	Why Is a Centrifugal Casting?
Milwaukee	Jan. 7	Milwaukee Athletic Club	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
New Haven	Jan. 24	Hotel Barnum, Bridgeport	Norbert K. Koebel	Modern Heat Treating Furnaces and Atmospheres
New Jersey	Jan. 21	Essex House, Newark	Russell Franks	Stainless Steels
New York	Jan. 14	Building Trades Bldg.	E. A. Schoefer	Hot Gas Corrosion of Metals for Services at Elevated Temperatures
Notre Dame	Jan. 9	Engineering Audit., Univ. of Notre Dame	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Philadelphia	Jan. 25	Engineers' Club	J. O. Almen	Residual Stresses
Pittsburgh	Jan. 10	Roosevelt Hotel	C. C. Furnas	Future Trends in Aviation Technology
Pueblo Group	Jan. 17	Pueblo, Colo.	W. H. Oldacre	Cutting Oils
Puget Sound	Jan. 16	Washington Athletic Club, Seattle	F. J. Robbins	Machinability
Rochester	Jan. 14	Lower Strong Audit., Univ. of Rochester	Ralph Lee	Humanics in the Foundry
Rockford	Jan. 8	Faust Hotel	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Rocky Mountain	Jan. 18	Denver, Colo.	W. H. Oldacre	Cutting Oils
Saginaw Valley	Jan. 15		Hans Ernst	Metal Cutting Research
Springfield	Jan. 21	Sheraton Hotel	Matthew J. Donachie	Spring Materials—Particularly Age Hardening of Alloys of Copper
St. Louis	Jan. 11	York Hotel	C. H. Herty, Jr.	Steelmaking Practice as It Affects Properties of Interest to the User
Texas	Jan. 16	Golfcrest Country Club	Norman F. Barnes	Color Facts & Fantasies
Toledo Group	Jan. 23	Toledo Yacht Club	Richard Schneidewind	Cast Iron
Warren	Jan. 14	IOOF Hall	A. A. Bates	An American Metallurgist in the European War
West Michigan	Jan. 21	Hotel Rowe, Grand Rapids	James Crowe	Deep Drawing of Sheet Steel
Worcester	Jan. 9	Hotel Sheraton	F. S. Badger	Precision Castings
York	Jan. 9		Horace E. Knerr	General Hardening

CALENDAR OF OTHER MEETINGS

Jan. 7-11—Society of Automotive Engineers. Annual Meeting and Engineering Display, Book-Cadillac Hotel, Detroit. (John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18, N. Y.)

Jan. 21-23—Institute of Scrap Iron and Steel, Inc. 1946 Convention, Congress Hotel, Chicago.

Feb. 4-8—National Metal Congress and Exposition. Public Auditorium, Cleveland. (W. H. Eisenman, 7301 Euclid Ave., Cleveland 3, Ohio.)

Feb. 4-8—American Society for Metals. 27th Annual Convention, Hotel Statler, Cleveland. (W. H. Eisenman, Secretary, 7301 Euclid Ave., Cleveland 3, Ohio.)

Feb. 4-7—American Welding Society. National Meeting, Cleveland Hotel, Cleveland. (Miss M. M. Kelly, Secretary, 33 West 39th St., New York 18, N. Y.)

Feb. 6-8—American Industrial Radium and X-Ray Society. Annual Meeting, Hotel Hollenden, Cleveland. (Philip D. Johnson, Secretary, 111 West Monroe St., Chicago, Ill.)

Axel Weydell Dies, Was Treasurer Of Indianapolis Chapter 16 Years

Axel Weydell, 79 years old and treasurer of the Indianapolis Chapter of the American Society for Metals since 1929, died Oct. 25 at his home in Indianapolis. Mr. Weydell was with the P. R. Mallory Co. for 12 years where he was a designer and manufacturer of special tools.

He was born in Sweden and came to the United States in 1917. Prior to this he lived in Finland and was in the engineering business for himself.

Leslie Neil

Leslie Neil, an active member of the Rochester Chapter ASM for the past 15 years and a member of the Executive Committee for the past two years, died suddenly on Nov. 29 at the age of 46.

Mr. Neil had been connected with the American Brass Co. for the past 19 years, and had been Rochester representative for that firm for 15 years.

Bostwick Leaves N. Y. to Be Drever Agent

Resignation of Harry C. Bostwick as treasurer of the New York Chapter ASM, terminates a long list of other chapter offices. Mr. Bostwick has resigned from the Westinghouse Electric Corp. to become exclusive sales agent in western Pennsylvania and eastern Ohio for the Drever Co. of Philadelphia.

He was first on the New York Executive Committee in 1928-1933; was vice-chairman in 1934, chairman in 1935, secretary-treasurer in 1944 and treasurer in 1945. George A. Sands of Electro Metallurgical Co. has been appointed treasurer to succeed Mr. Bostwick.

McDonald's Magnesium Talk Covers Use in Engineering Structures

Reported by M. W. Williams
Hughes Tool Co.

John C. McDonald, assistant director of the metallurgical department of the Dow Chemical Co., addressed the Texas Chapter on Oct. 17 on "Magnesium", one of the lightest known metals suitable for engineering. He discussed the uses and applications of magnesium for the manufacture of metal products.

J. C. McDonald

Dr. McDonald pointed out that the use of magnesium in structures made possible the increase of section thickness, without increasing the weight, thereby gaining in rigidity. He illustrated his talk with slides which illustrated the damping capacity, fatigue strength, machinability and corrosion resistance of this metal. He also discussed the effect of surface finish on the strength of magnesium.

The coffee talk on "Fishing Techniques" was given by Andy Anderson, sports editor of the Houston Press.

Methods of Obtaining Desirable Structures in Cast Steel Outlined

Reported by Paul E. Lamoureux
Trans-Canada Air Lines

Cast steel microstructures and methods of obtaining desirable structures in cast parts were discussed by J. A. deBondy, metallurgist, Manitoba Steel Foundries Ltd., before the Manitoba Chapter on Oct. 11.

Mr. deBondy emphasized the fact that all steel starts out as a casting with a coarse, dendritic structure. Steel in this condition has low impact strength, but this condition can be corrected by annealing, which refines the grain structure, and by various other heat treatments. The speaker warned of the danger of overheating and decarburization with the attendant deleterious effects on the mechanical properties of the parts.

Dealing with austenitic manganese steel castings, he showed that reheating of austenitic steels will cause carbide precipitation and induce brittleness. Oxy-acetylene cutting or welding of Hadfield steel invariably causes carbide precipitation in the weld or cutting zone and this can be corrected only by re-heat treating the part.

Mr. deBondy also dealt with gray and white iron castings. Throughout his talk the various points were driven home by the showing of slides of appropriate photomicrographs and relating case histories based on personal experiences.

West Michigan Chapter Hears About Salt Baths

Reported by D. Bradford Apted
Process Engineer, Grand Rapids Stamping Div., G.M.C.

Speakers' table at the Oct. 15th meeting of the West Michigan Chapter included (left to right): Richard C. Fox, Continental Motors Corp., treasurer; Richard Hammerstein, Park Chemical Co., member of the Executive Committee; C. R. Foreman, metallurgist, Park Chemical Co., Detroit, who spoke on "Heat Treatment in Salt Baths"; R. L. Edison, LaSalle Steel Co., chairman; Donald A. Paull, Sealed Power Corp., secretary; and the speaker's father, C. L. Foreman of Crucible Steel Co. of America.

German Steel Industry Described by T. G. Foulkes

Reported by R. L. Deily
Bethlehem Steel Co.

Experiences while recently investigating German metallurgical developments were recounted by T. G. Foulkes, assistant engineer of tests, Bethlehem Steel Co., before the Lehigh Valley Chapter. Mr. Foulkes presented a series of rapid descriptions of the trip, the life under wartime conditions, a brief glimpse of the active fighting front and then days of work building up a picture of the German metallurgical industry as it developed during the war.

The official purpose of the commission of which Mr. Foulkes was a member was "to determine what, if anything, could be learned about German metallurgical advances which could aid the United States and Allies". Mr. Foulkes reported that there was nothing he saw in the steel industry which would require our own engineers to take a back seat. The difficulties of getting information were fairly considerable, particularly when it is remembered that not once did the commission see a steel plant in operation.

As a result the commission had to build its story from plant records and conversation with German technical men. Mr. Foulkes reported that most of these technical men were willing to cooperate and as far as he could determine gave straightforward answers. In most plants men speaking English could be found so that it was seldom necessary to use official interpreters.

Two other members of the Lehigh Valley Chapter were also present in Europe during the time of the study—Professors Bradley Stoughton of Lehigh University and William Plank of Lafayette College. The Chapter was fortunate to have these men present, and in the exchange of reminiscences with the speaker and general widespread discussion, gained a vivid picture of European metallurgical standards and living conditions during the war.

Machinable Cast Irons May Have 60,000 Psi. Tensile

Reported by O. Cutler Shepard
Stanford University

Not many years ago the use of cast iron as an engineering material was generally limited to those applications where bulk and low unit strength were permissible. As metallurgical knowledge developed, however, it became apparent that by properly balancing the constituents of cast iron and by certain manipulations in production practice, the inherent desirable properties of the material could be enhanced several fold.

The results of this progress were traced by Albert G. Zima of the International Nickel Co. in a talk on "Cast Iron and Its Heat Treatment" for the Oct. 15th meeting of the Golden Gate Chapter. We now have readily machinable cast irons possessing tensile strengths as high as 60,000 psi., he pointed out. In fact, strengths as high as 80,000 to 100,000 psi. are obtainable in certain grades.

Unlike steel, the elastic modulus of cast iron increases with the tensile strength. Soft, low strength grades possess elastic moduli as low as 8 to 12 million, whereas for some of the high strength grades moduli as high as 25 to 29 million have been reported.

Mr. Zima suggested that a better understanding of the material would be obtained if we accepted the modern conception that gray cast iron is an alloy steel in which flakes of graphite are interspersed throughout the mass. The size, shape, and orientation of the graphite flakes, as well as the condition of the alloy steel matrix, affect the properties of the material. Superheating and inoculation as a means of obtaining fine well-distributed graphite flakes were discussed. The effects of various alloying elements and heat treatments on the matrix were also briefly considered.

Following the main part of his discussion, Mr. Zima devoted some time to the special types of cast iron, such as those possessing high and low expansion properties, special magnetic and electrical properties, and heat and corrosion resistance.

Gensamer Shows Relationship Between Mechanical Properties And Constitution of Alloys

Reported by F. M. Reinhart
Metallurgist, National Bureau of Standards

The 1945-46 season of the Washington Chapter was inaugurated by Maxwell Gensamer, head of Department of Mineral Technology, Pennsylvania State College, with a talk entitled "Mechanical Properties and Constitution of Alloys".

The effect of the size of the grains on the mechanical properties was the first of four phases discussed. Dr. Gensamer pointed out that to attribute the strength of a polycrystalline compound to the small amount of material between the grains is unsatisfactory because the requirements imposed upon such a small amount of material are too great. The strength can be shown to be the result of the interaction between the grains, or their reaction forces. Calculations show that these reaction forces alone can account for most of the strength of the alloy. Hence, the size of the grains has little effect on the strength.

The second part of the lecture was devoted to the strengthening effect of alloying elements in solid solution. It was shown that true stress-strain curves of a base steel with different alloying elements are geometrically similar and that the alloying elements have a systematic strengthening effect on the solid solution in an additive manner.

Next, the tensile strength and hardness of an alloy were shown to be a simple function of the spacing between the carbide particles, not their shape (spheroids or pearlite). As an illustration, it was pointed out that an 0.80% C steel and a 0.40% C steel both had the same strength when the mean free path between the carbides was the same.

The final phase of the lecture was on the effect of very small amounts of undissolved carbon and nitrogen on the yield strength and strain aging. If these small amounts of carbon and nitrogen are removed, the yield point of the mild steel is eliminated. In a steel which has no yield point there is no tendency for it to strain age.

Trip to Marianas Undertaken In Study of B-29 Operation

Reported by Norris Brown
General Manager, Western Technical Supply Co.

An illustrated account of a trip to the Marianas to promote the development of the B-29 airplane was presented at the regular meeting of the Wichita Chapter on Oct. 25 by Harold W. Zipp, chief engineer of the Boeing Airplane Co., Wichita Division.

Mr. Zipp gave a brief resume of preparations, outlining the briefing which they received and other details involved in getting ready for a plane trip of this magnitude. His itinerary included San Francisco, Honolulu, Guam, Tinian, and Saipan. Interesting details of the geography of the Marianas and the plant life existing thereon were described and illustrated, together with some sidelights of military life in the Marianas and such details of the B-29 operations as could be made public, including repair and maintenance and other operational details. The talk was supplemented by a considerable number of color photographs.

Notch Effects, Impact, Residual Stresses Affect Steel Selection

Reported by F. R. Anderson
Chief Metallurgist, Gardner-Denver Co.

Principles recommended for use in the selection of steels were discussed by E. C. Bain, vice-president and director of research, Carnegie-Illinois Steel Corp., at the October meeting of Rocky Mountain Chapter. Practice and theory seldom achieve the equal degree of importance they enjoyed under the persuasive guidance of this authority. Scientifically established properties of steel were first outlined, then applied to the selection of steels for practical purposes.

Detrimental notch effects, the well-worn bogey of designing engineers, were dressed in new clothing for a more understandable picture. Instead of simply citing figures to illustrate the loss to be expected from the presence of notches of varying sharpness, Dr. Bain explained the role of biaxial and triaxial tension stresses as the result of abrupt section changes. The fallacy of attempting to apply conventional tensile test results under such conditions of loading was shown. Instead of one force acting in one direction, two or three inhomogeneous forces were shown to act in a corresponding number of directions so that the heretofore observed behavior of ductility may almost disappear and failure may occur in a brittle manner. Very logical, but so often forgotten.

Economies to be enjoyed from use of the triple alloy steels in developing maximum strength properties because the alloying elements act together as multiplying factors in increasing hardenability were stressed. In support of this the work of Dr. Grossmann was cited.

"Blue Brittle" Tempering Range Discussed

Under adverse stress conditions of impact loading, the need for avoidance of the "blue brittle" tempering range of 500 to 700° F. was reviewed. The detrimental effect of tempering in this range to produce hardness values of Rockwell C-45 to 50 is measurable by use of the single blow impact test. The exact cause for this deficiency is yet to be definitely established. If, however, a need is felt for use of steels at Rockwell C-50, at the same time retaining good resistance to impact, austempering may sometimes fill the bill. All too few data are available in metallurgical literature on enhancement of impact by "hot quenching", especially with respect to tests at low temperature.

The role of residual stresses, introduced as the result of thermal, mechanical or diffusion treatments, in accelerating or retarding fatigue failures was presented. Complex stress developments were traced through various heat treatment cycles. Such stresses might be advantageous or detrimental and one was left with the feeling that in spite of their elusive characteristics it would be best to make their acquaintance.

Machinability as a factor in steel selection was included and an excellent thought left with the audience was to "pick a material low in strength and ductility values for ease in machining". This is in direct variance from the usual need for constructional materials; ideally the use of such a material coupled with heat treatment after completion of machining to restore good properties would fill the gap between the two requisites.

The speaker's generous handling of questions following the formal talk cleared up some points and deferred others which at the present time must go unanswered pending results of investigative work already under way. The excellent correlation of scientific facts with practical problems was highly appreciated by the audience.

Cleveland Chapter Is Host To ASM Annual Meeting

Reported by Stewart M. Grant
Laboratory Supervisor, W. S. Tyler Co.

The Annual Meeting of the American Society for Metals was held in Cleveland on Nov. 2 in conjunction with the regular meeting of the Cleveland Chapter. National officers were present as follows: Kent R. Van Horn, president; C. H. Herty, Jr., vice-president and president-elect; A. L. Boegehold, trustee and vice-president-elect; H. D. McKinney, treasurer; H. K. Work, treasurer-elect; W. H. Eisenman, secretary; M. A. Grossmann, L. S. Bergen, R. W. Schlumpf, and A. E. Focke, trustees; and John Chipman, trustee-elect. Unable to be present was Trustee-Elect W. E. Jominy.

Chairman Ralph G. Kennedy, Jr. welcomed and introduced the national officers and then turned the meeting over to President Kent Van Horn, who introduced the new president, Dr. Herty.

Secretary Eisenman introduced two new members of the National Office staff, Dr. Taylor Lyman, secretary of the Handbook Committee, and Dr. John M. Parks, editor of books published by the Society.

The technical talk on "Steelmaking Practice as It Affects Properties of Interest to the User" was presented by President Herty. Prof. Gerald M. Cover, technical chairman, presided over a lively discussion period.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month.

1. ORES & RAW MATERIALS

Production; Mining; Beneficiation

1-48. **Microchemical Analysis of Sphalerite From Kristineberg, Sweden.** Anna-Greta Hybbinette. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 654-661.

Because the presence of iron as marmatite in sphalerite may cause serious loss of zinc, knowledge of the amount of iron remaining after flotation is important. Difficulty in collecting samples of pure sphalerite made desirable application of micromethods to the analysis of six samples of sphalerite from the Kristineberg mine in Sweden, varying in color from pale yellow to brown; the procedure used is presented here in detail. The iron content was found to vary from 1 to 8.5%, corresponding to a variation of 65 to 58% in zinc content. The normal composition of sphalerite from the Kristineberg mine is approximately 64% zinc, 2.5% iron, 0.2% cadmium, and 33% sulphur. 28 ref.

1-49. **Fluorescent Bead Test for Uranium in Minerals: A Critical Study.** M. Allen Northup. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 664-670.

Fluorescent sodium fluoride bead test will detect 0.05 microgram of uranium in a single grain of sample. It is specific except for columbium, which gives a fainter fluorescence. Excess cerium or rare earths interfere. Both troubles are overcome in minerals containing over 1% of uranium by adjusting the ratio of sample to sodium fluoride. An ether extraction method for separating uranium from columbium, cerium, and the rare earths permits detection of 0.0001% of uranium in 0.5 gram of columbite or non-uraniferous cerium minerals. Excess silicon dioxide, titanium dioxide, etc., may suppress fluorescence, but can be removed by extra heating. About 1 mole of uranium in 2000 of sodium fluoride forms a fluorescent complex when fused. At low flame temperatures any excess remains undissolved. At higher temperatures excess is converted to sodium uranite. 11 ref.

1-50. **The Treatment of Complex Gold Ores.** F. B. Mitchell. *Mine & Quarry Engineering*, v. 10, Oct. '45, pp. 245-251.

Sulpho-tellurides ores; base-metal ores containing gold; lead-gold ores; zinc-gold ores. 23 ref.

1-51. **A Note on Uranium.** *Mine & Quarry Engineering*, v. 10, Oct. '45, p. 244.

Occurrence; Great Bear Lake region.

1-52. **Nickel From Cuba.** Maurice F. Dufour and Robert C. Hills. *Chemical Industries*, v. 57, Oct. '45, pp. 621-627.

Nicaro produces nickel oxide by leaching with ammonia. In three years the process was developed from a pilot plant processing one ton of ore per day to a commercial installation capable of handling 3600 tons of ore per day.

2. SMELTING AND REFINING

2-112. **Mechanical Phase of Open-Hearth Steelmaking.** F. W. Sundblad. *Steel*, v. 117, Oct. 29, '45, pp. 125-126, 148.

Properly balanced and stable ratio between scrap prices and pig iron costs affords solution of charging problem at open-hearth shops. Scrap yard must become processing plant in the future by handling collection and preparation based on scientific surveys and mass machine technique.

2-113. **Furnace Operations and Steel Quality Discussed at Pittsburgh Conference.** Gerhard Derge. *Industrial Heating*, v. 12, Oct. '45, pp. 1780, 1782, 1784, 1786.

Automatic control of reversal; study of flame radiation; bath temperatures; pouring practice; molds and stools; steel quality.

2-114. **Lead Smelting.** W. H. Dennis. *Mine & Quarry Engineering*, v. 10, Oct. '45, pp. 237-243, 251.

Brief review of modern practice.

2-115. **Practice Followed in Use of Open-Hearth Charge Ores.** Clyde Denlinger. *Steel*, v. 117, Nov. 5, '45, pp. 148, 150, 188, 191.

Advantages and limitations of charge ores including soft fine, hard lump and briquetted ores, and nodules and sinter are considered. Use of wet ore is not recommended. Various combinations of these charging materials permit the use of certain percentages of pig iron in open-hearth heats.

2-116. **Influence of the Charge Upon Open-Hearth Furnaces.** H. F. Lesso and R. W. McCann. *Iron & Steel Engineer*, v. 22, Oct. '45, pp. 37-49.

Evaluates the effects of variations in the charge upon open-hearth performance.

2-117. **Talks About Steelmaking. Old Molds.** *British Steelmaker*, v. 11, Oct. '45, pp. 440-441.

The thoughts of 1940 to explain some of the puzzles of 1880.

2-118. **The Development of Electric Furnaces for Steelmaking.** Norman F. Dufty. *British Steelmaker*, v. 11, Oct. '45, pp. 442-445.

A historical outline of the development of the various types of electric furnaces.

2-119. **Reduction of Iron Ore in Clay and Steel Containers (Saggers).** J. P. Walker. Bureau of Mines Report of Investigations 3819.

Production of sponge iron in three sizes of clay refractory saggers and two sizes of low carbon steel containers; investigation of five types of desulphurizing agents and testing of four commercially available fuels as reducing agents.

2-120. **Production of Sponge Iron in a Shale-Brick Plant.** Donald W. Ross. Bureau of Mines Report of Investigations 3822.

Sponge iron comparable in quality to that made in the famous ceramic plants at Hoeganaes, Sweden, can be produced by carbon reduction in American common shale-brick plants. Experiments conducted at a New York State brickyard described.

2-121. **Determination of Metallic Iron and Oxygen in Sponge Iron.** J. P. Morris. Bureau of Mines Report of Investigations 3824.

Determination of the degree of reduction attained in the manufacturing process. Four methods for determining metallic iron and oxygen discussed—the mercuric chloride method, copper sulphate method, hydrogen reduction method, and hydrogen evolution method.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

3. PROPERTIES OF METALS AND ALLOYS

3-205. **Iron-Manganese Alloys: The Properties of Cold-Worked and Heat Treated Alloys Containing 1 to 7% Manganese.** R. S. Dean, J. R. Long, T. R. Graham and R. G. Feustel. American Society for Metals Preprint 5, 1945, 22 pp.

Properties of material reduced 20, 40, 60, and 80% in thickness by cold rolling are reported. In the soft condition the tensile strength is increased by about 11,000 psi. for each 1% manganese. Cold working to 80% reduction produces a tensile strength of 192,600 psi., an elongation of 2.7% in 2 in., and a hardness of Rockwell C-38. Normalizing and annealing of cold-worked material produces essentially the same properties for a given temperature of treatment. Tempering of normalized material produces minimum strength and hardness independent of normalizing temperatures. 7 ref.

3-206. **New Aluminum Alloys Containing Small Amounts of Beryllium.** R. H. Harrington. American Society for Metals Preprint 12, 1945, 14 pp.

These new heat treatable compositions are of two types: (a) Aluminum-copper-beryllium with the copper and beryllium in the critical ratio of 7 to 1, and (b) Aluminum-copper-beryllium-cobalt with the cobalt and beryllium in the critical ratio of 6.5 to 1. Alloys develop superior strength properties as castings made by gravity-sand, centrifugal, and lost-wax methods combined with high thermal stability and unusual oxidation-corrosion resistance. They also develop useful wrought properties so that it is possible for one representative composition to meet requirements in both fields.

3-207. **Effect of Nickel on Physical Properties and Thermal Characteristics of Some Cast Chromium-Molybdenum Steels.** N. A. Ziegler and W. L. Meinhart. American Society for Metals Preprint 28, 1945, 41 pp.

Experimental evidence of the effect of nickel (up to 2%) on thermal characteristics and physical properties of steels containing 2.5% chromium, 0.5% molybdenum, up to 9% chromium, 1.5% molybdenum and 0.05 to 0.3% carbon. 49 ref.

3-208. **Tailoring 18-8.** Wilson G. Hubbell. *Western Machinery and Steel World*, v. 36, Oct. '45, pp. 446-451.

Brief discussion of some of the properties of stainless steels with respect to their use in aircraft production.

3-209. **Processing and Fabrication of Stainless Steel Sheet and Plate Products.** H. S. Schaufus and W. H. Braun. *Steel Processing*, v. 31, Oct. '45, pp. 625-629.

Deals with the chromium-nickel stainless steel group and its related alloys. Describes their chemical compositions, microstructures and physical properties.

3-210. **Aging of 75S Aluminum Alloys.** William L. Fink, J. A. Nock and M. A. Hobbs. *Iron Age*, v. 156, Nov. 1, '45, pp. 64-67.

Various aging treatments on 75S alloy, and their effects on the workability of the metal are described. Descriptions are given of the dimpling capacity, tensile properties, corrosion resistance and effects of cold working after quenching and before aging.

3-211. **Correlation of Mechanical Properties and Corrosion Resistance of 24S Type Aluminum Alloys as Affected by High Temperature Precipitation.** W. D. Robertson. *Metals Technology*, v. 12, Oct. '45, T.P. 1934, 12 pp.

It is shown that the effect of precipitation time and temperature on both the initial change and ultimate maximum mechanical properties and initial, maximum and ultimate susceptibility to intercrystalline corrosion of 24S type aluminum alloys can be expressed by an equation of the form: $t = K \cdot 10^{m/T}$. Because initial changes in properties may be expressed by this equation it is possible to define the time and temperature permissible in high temperature applications, especially with regard to the initial susceptibility to intercrystalline corrosion. 7 ref.

3-212. **Low Expansion High Nickel Alloy for Precision Parts.** F. G. Sefing and D. A. Nemser. *Product Engineering*, v. 16, Nov. '45, pp. 799-801.

Engineering properties of a casting alloy having low thermal expansion and the factors to be considered in using this alloy in precision machines and equipment are discussed. Curves showing mean coefficients of expansion are included.

3-213. **Vanadium Data Sheet—Wrought Vanadium Constructional Steels in Heavy Sections.** *Vancoram Review*, v. 4, Summer, '45, pp. 14-15, 17.

Groups include wrought vanadium constructional steels in heavy sections, wrought vanadium steel in light sections, vanadium spring steels, and wrought vanadium tool steels. Analysis; treatment; properties; uses of each.

3-214. **Manganese-Molybdenum-Vanadium Cast Steel.** *Vancoram Review*, v. 4, Summer, '45, pp. 11, 20-21.

Minimum yield strengths between 95,000 and 150,000 psi. with minimum reduction of area values between 40 and 30% are being met consistently for various specifications. These exceptionally high tensile properties are obtained with a water quench followed by a tempering treatment well over 1000° F., even for the highest strengths, thus relieving all quenching strains and raising the ductility and the resistance to impact.

3-215. **Properties and Characteristics of Common Magnesium Casting Alloys.** J. D. Hanawalt, C. E. Nelson and R. S. Busk. *American Foundryman*, v. 8, Oct. '45, pp. 39-48.

Assists founder, manufacturer, and design engineer in the problem of choosing the alloy most favorable for their particular application. Part I presents pertinent technical data. Part II attempts to weigh these facts and to draw from them some practical working conclusions. Table presents the nominal compositions of the alloys covered together with designations commonly used in the United States and abroad. 16 ref.

3-216. **Selecting the Proper Heat Resistant Steel.** R. A. Lincoln. *Iron Age*, v. 156, Nov. 8, '45, pp. 74-77.

Characteristics of chromium-nickel steels are described, along with an evaluation as to their capabilities and limitations under varying service conditions.

3-217. **Wrought Heat Resisting Alloys for Gas Turbine Service.** C. T. Evans. *Metal Progress*, v. 48, Nov. '45, pp. 1083-1095.

Metallurgy involved in development and application of these materials reviewed. Compilation made of the significant properties of the older alloys which are not under secrecy restrictions, many of which can be used in parts of the new structures. "Base line" data presented so that engineers can readily see if there is any possibility of using them in contemplated structures requiring service at high temperature and definite loadings, and so that the newer alloys can be properly evaluated and compared by metallurgists and the designing engineers working on gas turbines and machines for other types of severe service.

3-218. **Factors Affecting the Hardenability of Boron-Treated Steel.** R. A. Grange and T. M. Garvey. American Society for Metals Preprint 10, 1945, 40 pp.

Increase in hardenability due to boron is correlated with the boron content and with the amount of a characteristic constituent which appears in boron-treated steels after special heat treatment. The increase in hardenability decreases with increasing carbon content; the implication is that boron will not increase the hardenability of hypereutectoid steel.

3-219. **Manganese Alloy Cast Steels (Materials & Work Sheet).** *Machine Design*, v. 17, Nov. '45, pp. 157-162.

Properties prescribed in ASTM specifications; characteristics; applications; fabrication; heat treatments.

4. STRUCTURE

Metallography and Constitution

4-73. **Influence of Carbon Content Upon the Transformations in 3% Chromium Steel.** By Taylor Lyman and Alexander R. Troiano. American Society for Metals Preprint 16, 1945, 44 pp.

Transformations in seven 3% chromium steels with carbon contents of 0.08 to 1.28% have been investigated as functions of time and temperature using microscope, dilatometer and X-ray diffraction. Isothermal transformation diagrams for these steels are presented. Each of the seven steels can contain both $(Fe, Cr)_3C$ and $(Cr, Fe)_7C_3$ after certain isothermal treatments although only the 0.89% carbon steel contains both carbide phases following treatments designed to produce equilibrium at high sub-critical temperatures. The previous structure has a marked influence upon the rate of formation of $(Cr, Fe)_7C_3$ from alpha plus $(Fe, Cr)_3C$. 16 ref.

4. STRUCTURE (Cont.)

4-74. **Critical Points of S.A.E. 4340 Steel as Determined by the Dilatometric Method.** D. Niconoff. American Society for Metals Preprint 19, 1945, 18 pp.

As determined by the dilatometric method, the position of the critical points observed on heating S.A.E. 4340 steel depends upon the prior structure of the steel as well as upon the heating rate employed. Corresponding critical temperatures obtained on cooling are affected by the time and temperature of soaking preceding the cooling operation, but even more so by the variation in cooling rates. 4 ref.

4-75. **High Forging Temperatures Revealed by Facets in Fracture Tests.** J. Robert Strohm and W. E. Jominy. American Society for Metals Preprint 25, 1945, 16 pp.

Appearance of large grains or facets in the fracture of alloy steel forgings is an indication of questionable quality and of high temperature forging. Temperatures below which facets are not formed were accurately determined by means of thermocouples inserted in test pieces and by fracture testing production forgings. Facets appear in fractures of quenched and tempered forgings and not in normalized or annealed forgings. The tensile properties of bars containing facets are found to be less favorable than those which have no facets.

4-76. **Relationship Between the Deep Drawing Properties of Autobody Sheet, Its Austenitic Grain Size and McQuaid-Ehn Carburizing Characteristics.** K. J. B. Wolfe. American Society for Metals Preprint 27, 1945, 17 pp.

Carburizing tests carried out on sample batches which consistently gave good and bad results on similar pressings, in order to determine the austenitic grain size and the McQuaid-Ehn characteristics of samples. It has been shown that sheets having good pressing properties possess a small austenitic grain size associated with an "abnormal" microstructure. On the other hand, sheets which have inferior pressing properties show a large austenitic grain size associated with a "normal" McQuaid-Ehn characteristic. Theory has been postulated to explain these results. 8 ref.

4-77. **The Nucleus of the Atom, Part XXI.** Samuel Glasstone. *Monthly Review*, v. 32, Oct. '45, pp. 999-1000, 1050.

Positive charges on the nucleus; increasing complexity of atomic structure; structure of the nucleus; the neutron in nuclear structure; isotopes.

4-78. **Lamellar and Mosaic Structures—X-Ray and Thermodynamic Evidence.** Helmut Thielsch. *Metals Technology*, v. 12, Oct. '45, T.P. 1931, 6 pp.

Reviews the more important of the results obtained by other investigators, especially in Germany, where a great deal of attention has been given to mosaic structure during the last three years. 54 ref.

4-79. **Partition of Molybdenum in Hypo-Eutectoid Iron-Carbon-Molybdenum Alloys.** Fred E. Bowman. American Society for Metals Preprint 2, 1945, 16 pp.

Partition of molybdenum between the ferrite and carbide resulting from the isothermal transformation of austenite as well as from tempering martensite is extended to hypo-eutectoid alloys of iron, carbon, and molybdenum. High molybdenum concentration in the carbides formed isothermally and subcritically from austenite proves that molybdenum must diffuse during the eutectoid reaction. 10 ref.

5. POWDER METALLURGY

5-53. **Boron Carbide—Hardest Man-Made Material.** Edwin Laird Cady. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1058-1063.

Advantages and disadvantages; boron carbide vs. diamond dust; solid parts with fine finish; fabrication methods; fastening and assembly practice; applications—gages and parts; blast nozzles and other uses.

5-54. **Metal Powders.** W. J. Kroll. *Metal Industry*, v. 67, Oct. 5, '45, pp. 214-216.

Production of relatively pure metal powders or metal alloy powders by the fused electrolyte method. Methods for removing adherent bath salts from the metal crystals are dealt with and numerous examples given. (Paper presented before the Electrochemical Society.)

5-55. **Radio Frequency Cores of High Permeability.** Hans Beller and G. O. Altmann. *Electronic Industries*, v. 4, Nov. '45, pp. 86-89, 152, 154.

Cores made from a special grade of carbonyl iron powder to meet the demand for powdered magnetic cores combining both high permeability and low losses at frequencies up to several megacycles.

5-56. **Hot-Pressing of Iron Powders.** Otto H. Henry and J. J. Cordiano. *Metals Technology*, v. 12, Oct. '45, T.P. 1919, 10 pp.

Properties that can be obtained on hot-pressed iron powders are far superior to the properties of cold-pressed and sintered iron powders. However, the time, temperature and pressure requirements are too severe for present-day commercial equipment. With advances in processing and materials, the hot-pressing of metal powders should take its place as an important method of fabricating metal.

5-57. **Pressing Complicated Shapes From Iron Powders.** Claus G. Goetzel. *Metals Technology*, v. 12, Oct. '45, T.P. 1920, 13 pp.

Two processes for molding uniformly dense parts with complicated shapes from powdered metals described in detail. First refers to curved parts; the second is especially adapted to parts having one or more recesses or steps. Both methods are applied under the condition that presents the more difficult problem. Variable factors in molding powdered metal parts reviewed. Idealized procedure considered briefly.

5-58. **Sectional Carbide Molds Facilitate Recutting.** *Iron Age*, v. 156, Oct. 25, '45, pp. 50-51.

Major advantage of the sectional as opposed to the solid nib is the fact that the nib may be recut and that the life of the mold is limited only by the amount of stock which is removed. Recutting to the original size is advantageous for both standard shapes and special shapes that call for long production runs, because worn molds are reclaimable. In addition to being recut to original size a sectional nib mold also may be recut to larger size within the limits of the nib diameter.

5-59. **Powder Metallurgy Production of Machine Parts.** *Machinery* (London), v. 67, Sept. 27, '45, pp. 337-343.

During the course of a twelve-month, more than 5,000,000 man-hours and 1,250,000 lb. of critical metals were saved in making gun parts from powdered metal. Approximately 2 hr. was required to machine the gun part when it was a forging. Now it is being made from powder in 22 sec., not including the heat treatment. Powdered metal part requires no machining, except for drilling a small hole.

5-60. **Sintered Iron.** *Automobile Engineer*, v. 35, Oct. '45, p. 400.

Its carrying capacity when used for bearing liners.

5-61. **Metal Powders.** W. J. Kroll. *Metal Industry*, v. 67, Oct. 12, '45, pp. 229-230.

Gives practical examples of fused salt electrolysis with insoluble and with soluble anodes, and also sets out the conclusions arrived at.

6. CORROSION

6-136. **Investigation of a Type of Failure of 18-8 Stabilized Stainless Steel.** Walter Kahn, Harold Oster and Richard Wachtell. American Society for Metals Preprint 15, 1945, 17 pp.

Deals with a type of high temperature failure found in 18-8 stabilized stainless steel, much of which has been used in modern aircraft exhaust systems. With perhaps greater emphasis than is generally found in the literature, a type of failure is traced which appears to be due to carburization of the stainless steel by exhaust gases under certain conditions. It has been shown that if more carbon is introduced than can be absorbed by the stabilizing element, actual carburization takes place, and deterioration of the stainless steel occurs as though no stabilizing element were present.

6-137. **Zinc Yellow—A Corrosion-Inhibitive Pigment.** W. F. Spengeman and D. H. Lawson. *Paint, Oil & Chemistry*, v. 108, Oct. 4, '45, pp. 9-10, 12, 28.

History; composition; manufacture; properties; use in corrosion-inhibitive primers. 17 ref.

6-138. **Corrosion Stability of Magnesium Alloys.** *Light Metals*, v. 8, Oct. '45, pp. 492-505.

Discusses corrosion resistance of the ultra-light alloys in terms of a high purity magnesium base versus one of normal purity coupled with high manganese. Care needed in interpreting salt-spray test results as guides to performance in service. 13 ref.

6-139. **Inhibition of Corrosion of Metal in Contact With Water and/or Steam.** W. Murray. *Gas Times*, v. 44, Sept. 22, '45, pp. 7-9.

Discusses methods of inhibition of corrosion of metal and gives some consideration to the reason for the occurrence of corrosion and its mechanism.

6-140. **Assessing Wear Due to Friction and Corrosion.** Phillip M. Fisk. *Iron Age*, v. 156, Oct. 25, '45, pp. 65-67.

Although it has been well known for many years that metals in contact with each other form couples and that in general the more electropositive metal corrodes, little data have appeared in the literature to add to the understanding of corrosion due to frictional wear. This problem as applied to door hinges specifically, but equally applicable to any sheet metal part subject to similar service conditions, was thoroughly investigated by the use of a specially designed testing machine. Complete design details of this testing device and the computation of results, first appearing in *Sheet Metal Industries*, London, presented.

6-141. **Cathodic Protection Controls Polarity to Buck Corrosion Current.** L. P. Sudrabin. *Power*, v. 89, Nov. '45, pp. 76-79.

Method stifles the current flow that accompanies metal corrosion (electrochemical theory) by superimposing a regulated current flow from a properly placed special anode through the corroding liquid to metal surface protected. (Abstract of paper for Engineers Society of Western Pennsylvania.)

6-142. **Report of Committee A-5 on Corrosion of Iron and Steel.** American Society for Testing Materials Preprint 4, 1945, 21 pp.

Reports subcommittees engaged in making periodic inspections of black sheet, galvanized sheet, and wire and wire products exposed to outdoor weathering. Report of Subcommittee III on Inspection of Annapolis Tests (specimens of copper-bearing and non-copper-bearing corrugated black sheets). Report of Subcommittee VIII on Field Tests of Metallic Coatings (galvanized sheet exposure tests; exposure tests of metallic-coated hardware). Report of Wire Inspection Committee on Field Tests of Wire and Wire Products (atmospheric corrosion tests on wire and wire product specimens after exposure for about eight years at each of eleven locations).

7. CLEANING AND FINISHING

7-237. **New Cleaning Process Affords Brighter Finish on Nails.** *Steel*, v. 117, Oct. 29, '45, pp. 116, 118.

Process described by M. Ransohoff, president, Ransohoff Co., at the annual meeting of the Wire Association. By the new method of cleaning and dewhiskering nails the amount of labor is reduced, the rate of operation increased and a superior product obtained.

7-238. **Anodic Coatings With Crystalline Structure on Aluminum.** Cyril S. Taylor, C. M. Tucker and Junius D. Edwards. Electrochemical Society Preprint 88-9, 1945, pp. 107-114.

Variety of experiments which indicate that an X-ray diffraction pattern corresponding to that of gamma alumina is obtained when the formation potential is above about 100 volts. Formation of a crystalline coating does not seem to be a characteristic of the electrolyte, for crystalline coatings were obtained with a variety of electrolytes. High electric stress seems to favor the formation of an ordered oxide lattice. 12 ref.

7-239. **Bright Dipping.** Gustaf Soderberg. Electrochemical Society Preprint 88-10, 1945, pp. 115-120.

Defines bright dipping, reviews existing bright dipping processes for copper and its alloys, cadmium plate and zinc plate, magnesium and lead. Applications are listed and discussed. Theory of bright dipping, paralleling that for anodic brightening, is proposed.

7-240. **Automatic Spray Painting.** W. Beacham. *Industrial Finishing*, v. 21, Oct. '45, pp. 36-40, 42, 44, 46.

Some of the merits, possibilities and limitations of automatic spray painting. What you need to know and do to put in, set up, operate and maintain this kind of specialized high-production equipment in order to make it really successful and profitable.

7-241. **Priming Aluminum Sheets Two Sides by Roller Coating.** *Industrial Finishing*, v. 21, Oct. '45, pp. 48-50.

With the aid of a specially formulated zinc chromate primer, job is being accomplished by the use of new equipment which combines a series of tanks, driers and rollers. Crew of six men now prime-coat both sides of large aluminum sheets at the rate of 350 an hour; whereas by former methods the same crew could do only 18 or 20 sheets an hour.

7-242. **Our Pattern for Reconversion.** Dale W. Musselman. *Industrial Finishing*, v. 21, Oct. '45, pp. 62, 64, 66, 68, 70.

Progressive arrangement of work stations along well planned conveyor lines. Particular attention to treating and conditioning all surfaces before painting; and to quickly drying the paints.

7-243. **Controlled Barrel Burnishing Action Imparts Precise Finish to Metal Parts.** *American Machinist*, v. 89, Oct. 25, '45, pp. 114-117.

Deburring and polishing parts using wood-lined barrels and granite chips resulted in the elimination of hand finishing.

7-244. **Use of Infra-Red Radiation in Drying Operations.** A. L. Roberts. *Steel Processing*, v. 31, Oct. '45, pp. 649-651.

For the majority of industrial solids, the direct heating effect of radiation is confined to the surface of the material, and, for this reason, radiant heating processes are best suited to simple and thin shapes, in which as much as possible of the surface area of each individual article can be exposed to radiation.

7-245. **Solvents in the Paint Industry, Part 5.** Richard B. Pollak. *Paint, Oil & Chemistry*, v. 108, Oct. 4, '45, pp. 14, 22.

Inflammability of solvents. 5 ref.

7-246. **New Process Speeds up Galvanizing of Wire.** *Steel*, v. 117, Nov. 5, '45, pp. 136, 138.

Stream of molten zinc kept in circulation well above dross line. Wire coated by this process is drawn to diameter corresponding to 95% reduction of area with speeds in some fine sizes of 2000 fpm. Tensile and torsional values on galvanized rope wire are above specified range and coatings are uniform and resist abrasion.

7-247. **Processing Metal Components at Windsor Engineering.** Fred M. Burt. *Products Finishing*, v. 10, Oct. '45, pp. 41-42, 44, 46, 48.

In the plant of Windsor Engineering Co., Inc., Glendale, Calif., hundreds of thousands of aircraft component parts, ranging from tiny springs to ammunition trays and air scoops or collectors, are given the Irco-Izing process chemical dip treatment to inhibit rust and are then dipped and/or sprayed. In addition, many other metal parts are similarly processed for other plants in the country. View of production line shown.

7-248. **Finishing Clinic.** Allen G. Gray. *Products Finishing*, v. 10, Oct. '45, pp. 50-52, 54, 56, 58, 60, 62.

Evaluation of surface finishes; brass plating—still most widely used method for rubber adhesion; electropolishing—present status; aluminum coated steel—new possibilities; strip for lead coatings; analysis of hydrofluoric-nitric acid pickling bath.

7-249. **Performance Tests for Metal Finishes.** Burr Price. *Products Finishing*, v. 10, Oct. '45, pp. 94-96, 98, 100, 102.

Mechanical testing for performance; the conical mandrel; scratch adhesion and mar testing; abrasion resistance of coatings on aluminum.

7-250. **White Porcelain Enamel Color Variation and Its Control.** R. F. Duncan. *Enamelist*, v. 22, Oct. '45, pp. 10-14.

Methods of matching; stabilizing compounds; numbering systems; functions of stabilite; how to use.

7-251. **How to Choose an Organic Finish Before Starting Production.** P. W. Prouty. *Enamelist*, v. 22, Oct. '45, pp. 15-24, 51-52.

Compositions and properties; selection of finishes; testing; making test samples; evaluation of results.

7-252. **The Classification and Properties of Porcelain Enamels, Part II.** *Enamelist*, v. 22, Oct. '45, pp. 25-30.

Methods of testing described. 8 ref.

7-253. **Low Temperature Ceramic Finishes for Home Appliances.** Gilbert C. Close. *Finish*, v. 2, Nov. '45, pp. 13-15.

New type infra-red home heater unit employs alumina silicate coating.

7-254. **Sodium Hydride Process for Descaling Steel.** J. Albin. *Iron Age*, v. 156, Nov. 8, '45, pp. 58-63.

Descaling is uniformly accomplished without hydrogen embrittlement or loss of metal, and in generally less time than by other pickling methods. Discusses the development of the process by du Pont and includes practical data for large scale application.

7-255. **The Technique of Sheet Galvanizing by the Hot Dip Process.** Harold Edwards. *Sheet Metal Industries*, v. 22, Oct. '45, pp. 1725-1730, 1736.

The action of molten zinc on iron and steel; the influence of nickel and chromium plating; galvanizing bath design. 10 ref.

7-256. **The Surface Preparation of Certain Cold-Worked Steels by Pickling.** P. D. Liddiard. *Sheet Metal Industries,* v. 22, Oct. '45, pp. 1731-1736.

Recommends the use of a solution containing nitric and sulphuric acids for the surface preparation of cold-reduced steel, prior to subsequent protective treatment. 3 ref.

7-257. **The Influence of Natural Convection on the Effectiveness of Radiant ("Infra-Red") Heating and Its Bearing on the Choice of Heating Systems.** J. B. Carne. *Sheet Metal Industries,* v. 22, Oct. '45, pp. 1757-1763.

Attention is given mainly to the physical factors on which attainable temperature depends. 3 ref.

7-258. **Metal Finishing, Part VIII.** H. Silman. *Sheet Metal Industries,* v. 22, Oct. '45, pp. 1773-1774, 1781-1786.

Paints, varnishes and enamels; their formulation and application.

7-259. **Steam Turbine Repaired by Metallizing.** Henry M. Atwood. *Power Plant Engineering,* v. 49, Oct. '45, p. 71.

By metallizing, piece of equipment costing over $60,000 and not replaceable under present conditions has been restored to service at a cost of less than $215.

8. ELECTROPLATING

8-129. **Current Zinc Electroplating Practice.** Allen G. Gray. *Steel,* v. 117, Oct. 29, '45, pp. 110, 112, 114, 146.

Cyanide plating solution control and maintenance and preparation of base metals are discussed. 7 ref.

8-130. **The Adhesion of Electrodeposits, II. General Considerations.** A. L. Ferguson and Elmer F. Stephan. *Monthly Review,* v. 32, Oct. '45, pp. 1006-1015, 1018-1021.

Force involved in adhesion; perfect adhesion is not an absolute quantity; meaning of degree of adhesion and perfect adhesion; highest type of bond between deposit and base metal; polished versus etched surfaces for better bonding.

8-131. **High Speed Zinc Plating.** A. E. Carlson and M. J. Krane. *Monthly Review,* v. 32, Oct. '45, pp. 1022-1026.

Uniformity of both finish and quality and more positive control of coating thicknesses, which are possible with the electrolytic process, offer advantages over the hot dipping method. High current efficiency, high limiting current densities and low resistivity of improved modern electrolytic acid processes favor high speed production and lowered operating costs. Baths of fluoborate electrolytes possess promising high speed plating possibilities. Exploration of the zinc compound has resulted in the development of a bath which offers new advantages.

8-132. **Electricity for the Plater, III.** D. A. Cotton. *Products Finishing,* v. 10, Oct. '45, pp. 66-68, 70, 72, 74.

Consideration of concrete applications of Ohm's law, after discussing some of the factors in electric circuits, such as series and multiple or parallel connections.

8-133. **Thiourea in Acid Copper Plating Solutions.** Walter Brenner and C. B. F. Young. *Products Finishing,* v. 10, Oct. '45, pp. 76, 78, 80, 82, 84, 86, 88, 90.

Presents a comprehensive discussion of the effect of thiourea when used in acid copper plating solutions. 5 ref.

8-134. **Current Zinc Electroplating Practice—V.** Allen G. Gray. *Steel,* v. 117, Nov. 5, '45, pp. 142, 144, 182, 184, 186.

Shows how to test quality of electrodeposited zinc coatings. 19 ref.

8-135. **Plating of Plastics.** B. W. Pocock. *Metal Industry,* v. 67, Oct. 12, '45, pp. 234-235.

Suggests that the main improvement in the process which has yet to be discovered is the development of a plated metallic coating as elastic as rubber.

8-136. **Electro-Tin.** S. Wernick. *Metal Industry,* v. 67, Oct. 12, '45, pp. 235-236.

Discussion of the results and the practical applications of the process. It has been found that an undercoating of tin eases the subsequent zinc or cadmium plating of castings.

9. PHYSICAL AND MECHANICAL TESTING

9-121. **Temper Brittleness.** John H. Hollomon. American Society for Metals Preprint 11, 1945, 69 pp.

During the tempering of most medium and high alloy steels a transformation can occur which decreases the impact energy of the steel without material effect on the other physical properties. Previous measurements on the effects of metallurgical variables upon the susceptibility to this embrittlement have been re-evaluated. Indicates decrease in impact energy is caused by a precipitate which forms from solid solution as do precipitates which cause age hardening. It is suggested that the precipitate may be iron nitride. Discussion of the relations between the effects of this precipitate on the impact properties and its effects on the flow and fracture characteristics of steel is included. 64 ref.

9-122. **Effects of Combined Stresses and Low Temperatures on the Mechanical Properties of Some Non-Ferrous Metals.** D. J. McAdam, G. W. Geil, and R. W. Mebs. American Society for Metals Preprint 18, 1945, 42 pp.

By means of tension tests of notched specimens an investigation has been made of the mechanical properties of K-monel metal, nickel, plain and leaded phosphor bronzes, commercial aluminum and high purity aluminum. Diagrams are presented to show the influence of notches and of the stress system on resistance to plastic deformation, resistance to fracture, and ductility between room temperature and −306° F. Study is made of the quantitative variation of mechanical properties with temperature. Discussion is also given of the correlation between ductility and the stress-temperature lines for yield stress, ultimate stress and initial technical cohesion limit, and of the "normal" variation of mechanical properties with temperature.

9-123. **Fracture of Metals Under Combined Stresses.** D. J. McAdam. American Society for Metals Preprint 29, 1945, 29 pp.

Attention is confined to the influence of combined stresses. For a specific temperature, rate of deformation, and amount of prior plastic deformation, the resistance of a metal to fracture, its technical cohesive strength, may be represented by a curved surface in a diagram with the three principal stresses as co-ordinates. Cohesive strength of a brittle metal is represented by a surface symmetrical with reference to the locus of polar-symmetric stresses and either circular or hexagonal in cross-section. Surface tapers non-linearly to the point representing the disruptive stress. A similar surface may be used to represent the initial technical cohesive strength of a ductile metal. The ideal locus of fractures of a ductile metal has either circular or scalloped hexagonal cross-sections. If the surfaces have circular cross-section, resistance to fracture and resistance to flow are similar functions of the same variables, namely, plastic deformation, temperature, strain rate, and the stress combination. 17 ref.

9-124. **Quality Control, Part V—Mechanical Testing.** A. E. Hyde. *Canadian Metals and Metallurgical Industries,* v. 8, Oct. '45, pp. 26-29, 45.

Sampling; preparation of test specimens; mechanical testing equipment; tensile testing machine jaws; determination of yield strengths; determination of elongation.

9-125. **Microhardness Testing of Materials.** Vincent E. Lysaght. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1079-1084.

How the Knoop indenter has been commercially adapted in the Tukon hardness tester to provide an outstandingly useful tool for measuring the hardness of microscopically small areas of metals. 13 ref.

9-126. **Addition Method for Calculating Rockwell C Hardness of the Jominy Hardenability Test.** Walter Crafts and John L. Lamont. *Metals Technology,* v. 12, Oct. '45, T.P. 1928, 21 pp.

Outline of method; determination of addition increments; carbon-base hardness; alloy addition units; martensite increment; maximum hardness; discussion of the method of calculation; Jominy hardness of S.A.E. and NE steels.

9-127. **An Appraisal of the Factor Method for Calculating the Hardenability of Steel From Composition.** G. R. Brophy and A. J. Miller. *Metals Technology,* v. 12, Oct. '45, T.P. 1933, 10 pp.

Standard end-quenched hardenability bars were hardened in a General Motors quenching rig after having been heated 1 hr. at the temperatures shown. The hardness distribution was determined over their lengths at two flats 180° apart and the readings were averaged. Typical hardenability curves are shown. Results indicate that a further elaboration of the Grossmann principle will be necessary before it can be safely applied to steels of ordinary commercial complexity. 8 ref.

9-128. **Fatigue in Light Metals.** James L. Erickson. *Light Metal Age,* v. 3, Oct. '45, pp. 17-20, 31, 44.

Considers the phenomena of fatigue failure of metals, with special reference to aluminum and magnesium alloys. Discusses such aspects as the range of stress, method of performing fatigue tests, the effect of surface conditions, temperature, recrystallization, and elastic hysteresis. 20 ref.

9-129. **Plastic Bending—Approximate Solution.** Wm. R. Osgood. *Journal of the Aeronautical Sciences,* v. 12, Oct. '45, pp. 408-420.

Gives an approximate solution, which, in particular, makes it possible to determine slopes and deflections. The exact determination of these quantities is usually practically impossible in the plastic range. 3 ref.

9-130. **On the Dynamics of Elastic Buckling.** J. H. Meier. *Journal of the Aeronautical Sciences,* v. 12, Oct. '45, pp. 433-440.

Time-deflection relations are investigated when an axial force is rapidly applied to a nearly straight bar. Calculations show that a center deflection of 11% of the original hinge distance increases the elastic buckling force by only 1.5%, while the hinge distance is decreased by 3%. Where it is of importance and the damping constants can be established, a correction factor for damping can readily be applied to the respective equations. 3 ref.

9-131. **Influence of Prestressing and Cyclic Stressing on Stress-Strain Characteristics of Magnesium Alloys.** F. A. Rappleyea, R. E. Perry and G. Ansel. *Journal of the Aeronautical Sciences,* v. 12, Oct. '45, pp. 448-454, 460.

Factors that produce Bauschinger effects in most metals operate in magnesium. In addition, the stress-strain curves of magnesium upon prestressing or cyclic loading are influenced by the mechanisms of deformation (slip and twinning) occurring in this metal. Effects of recovery on the stress-strain curve are covered. Results are analyzed, and recommendations as to how to cope with the few problems caused by prestressing or cyclic loading are made. 13 ref.

9-132. **Photo-Grid Techniques for Measuring Distortion.** *Iron Age,* v. 156, Nov. 8, '45, pp. 78-81.

Stretch and flow of metal during forming operations or in the testing of tensile coupons can readily be observed by distortion of grids applied photographically to sheet metal or tensile specimens. Details of techniques recently developed by Consolidated Vultee Aircraft Corp. and North American Aviation, Inc.

9-133. **Progress Report on Fatigue Strength of Structural Welds.** American Railway Engineering Association *Bulletin,* v. 47, Sept.-Oct. '45, pp. 55-57.

Details of the specimens for the various tests are shown and results of the fatigue and static tests tabulated.

9-134. **A Discussion on the Notch Impact Test and Its Interpretations.** A. Fisher. *Metallurgia,* v. 32, Sept. '45, pp. 192-198.

The author discusses some of the obstacles which have prevented much progress towards rationalizing design methods for notched components; suggestions are made regarding testing methods and analyses of results.

9-135. **The Effect of Combined Stresses on the Mechanical Properties of Steels Between Room Temperature and −188° C.** D. J. McAdam, Jr., G. W. Geil, and R. W. Mebs. American Society for Testing Materials Preprint 22, 1945, 34 pp.

Tension tests were made of unnotched and variously notched specimens of carbon steels and alloy steels at several selected temperatures between room temperature and that of liquid air (−188° C.). Comparison is made with results obtained with some non-ferrous metals. Diagrams reveal the influence of combined stresses and stress concentration on mechanical properties at various temperatures. Other diagrams show the quantitative variation of these properties with temperature. Accelerated increase of the yield stress and decrease of ductility of iron and steels with decrease of temperature is anomalous. A "normal" metal shows not more than 75% increase of yield stress and no decrease of ductility with decrease from room temperature to −188° C. 12 ref.

9-136. **A Sulphur Print Method for the Study of Crack Growth in the Corrosion-Fatigue of Metals.** R. C. Brumfield. American Society for Testing Materials Preprint 28, 1945, 10 pp.

Description of the fatigue machine, the specimens and auxiliaries; damaging of the specimens; preparation of the specimens for sulphur printing; method for making sulphur prints; crack profiles; rate of crack penetration; method for analyzing sulphur prints; applications and limitations of the sulphur print method.

9-137. **A Study of Size Effect and Notch Sensitivity in Fatigue Tests of Steel.** H. F. Moore. American Society for Testing Materials Preprint 84, 1945, 15 pp.

Size effect in plain (unnotched) specimens is computed on assumption that a fatigue specimen which fails under cycles of reversed flexure behaves as if a fatigue crack started slightly *below* the surface of the specimen, where the nominal stress is slightly lower than that *at* the surface. Further assumption is made that at this point below the surface the nominal stress at failure is independent of size of specimen, and that the depth of this assumed starting point below the surface is also independent of the size of the specimen. The test results for six different steels gave endurance limits deviating from the results of computation based on the above assumptions ranging from 8.50 to 7.05% with a mean deviation of 4.19%. 5 ref.

10. ANALYSIS

10-85. **Analysis of Nickel-Plating Baths.** *Canadian Metals and Metallurgical Industries,* v. 8, Oct. '45, p. 46.

Nickel; chloride; boric acid; ammonium; silicon bronze.

10-86. **Flame Photometry—A Rapid Analytical Procedure.** R. Bowling Barnes, David Richardson, John W. Berry, and Robert L. Hood. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 605-611.

New instrument has been developed to make possible the rapid quantitative determination of the alkali metals (primarily sodium and potassium) in aqueous solution. Principle of operation of the instrument is based upon the quantitative measurement of the characteristic light emitted when a solution of the metal is atomized as a mist into a gas flame. Details of construction and operation are given. 12 ref.

10-87. **Determination of Sulphur Dioxide—Improved Monier-Williams Method.** John B. Thompson and Elizabeth Toy. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 612-615.

Modification of the official A.O.A.C. Monier-Williams method is described which possesses a marked increase in sensitivity over the volumetric application of the official method. Comparisons are made with the official method and a modified Bennett-Donovan method using dehydrated vegetable products. 8 ref.

10-88. **Polarographic Analysis of Aluminum Alloys.** I. M. Kolthoff and George Matsuyama. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 615-620.

Procedures have been developed for the polarographic determination of iron, copper, lead, nickel, and zinc in aluminum alloys. The alloy is heated with sodium hydroxide and the solution completed in nitric acid. In the absence of chloride, ferric iron and copper give well-separated waves. If the ratio of iron to copper is large, the ferric iron is reduced with hydroxylamine hydrochloride. The lead wave is determined after reduction of the ferric iron and precipitation of copper as cuprous thiocyanate and adjustment of the pH. The nickel and zinc waves are determined after adjustment of the pH of the solution of the alloy, and addition of hydroxylamine hydrochloride, thiocyanate, sodium citrate, and pyridine. 2 ref.

10-89. **Electrogravimetric Determination of Copper in Copper-Base and Tin-Base Alloys, by Controlled Potential Electrolysis.** James J. Lingane. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 640-642.

Copper is deposited from a slightly acid tartrate solution, which, for the separation of copper from tin, possesses a number of advantages over the hydrochloric acid solution used in the well-known Schoch-Brown method. From an acidic tartrate solution cupric copper is reduced directly to the metal, whereas reduction from a hydrochloric acid solution is complicated by step-wise reduction through the cuprous state. 7 ref.

10-90. **Application of Colorimetry to the Analysis of Corrosion Resistant Steels: Determination of Zinc.** Lewis G. Bricker, Sidney Weinberg, and Kenneth L. Proctor. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 661-663.

Photometric method for the determination of zinc in corrosion resistant steels by the dithizone method is presented. A General Electric spectrophotometer with a slit width of 10 millimicrons was used in developing the method, but it has also been adapted to the use of a Klett-Summerson photoelectric colorimeter using a Klett No. 52 green filter. 16 ref.

10-91. The Precipitation of Titanium by Tannin From Chloride Solution. W. R. Schoeller and H. Holness. *Analyst*, v. 70, Sept. '45, pp. 319-323.

Titanium is quantitatively precipitated by tannin from chloride solutions containing free hydrochloric acid below 0.02N concentration; it can thus be separated from aluminum, iron and vanadium, but not from zirconium and thorium. Titanium and zirconium can be recovered together by tannin precipitation from chloride solutions containing aluminum, iron and vanadium under controlled acidity conditions. The separation procedure is described. 7 ref.

10-92. Spectro-Chemical Analysis. G. Stanley Smith. *Metal Industry*, v. 67, Oct. 12, '45, pp. 226-228.

Methods used in Russia for the spectro-chemical analysis of metals are the results of developments in technique evolved by the lack of elaborate instruments. Methods and way in which they are put into practice are described with special reference to two instruments in particular. 4 ref.

10-93. An Application of Multiplier Photo-Tubes to the Spectrochemical Analysis of Magnesium Alloy. George A. Nahstoll and Ford R. Bryan. Optical Society of America *Journal*, v. 35, Oct. '45, pp. 646-650.

Describes a method used successfully in one of the Ford Motor Co. spectrographic control laboratories.

10-94. Photographic Materials for Quantitative Spectrography. D. R. Barber. *Engineering*, v. 160, Sept. 28, '45, pp. 257-260.

Points out that photography is by no means a perfect photometric tool, and indicates some of the more important factors which need to be taken into account when choosing the most useful type of photographic material for the particular investigation in hand.

10-95. The Application of the Vacuum-Fusion Method to the Determination of the Oxygen, Hydrogen and Nitrogen Contents of Non-Ferrous Metals, Alloys and Powders. H. A. Sloman. *Metallurgia*, v. 32, Sept. '45, pp. 223-227.

This investigator has applied the method to several nonferrous metals having easily reducible oxides, such as copper, lead, etc., but no satisfactory method has heretofore been devised for those metals such as aluminum, magnesium, etc., which have very stable oxides. (From Institute of Metals.)

10-96. Application of Micro-Combustion Technique to Metallurgical Analysis, Part II. G. Ingram. *Metallurgia*, v. 32, Sept. '45, pp. 237-239.

The determination of sulphur in steels by combustion technique is difficult to apply. The errors involved are discussed, and a solution to this problem is described, so that it is possible to determine the sulphur content in amounts above 0.01%, with 10-mg. samples.

11. LABORATORY APPARATUS, INSTRUMENTS

11-90. Anti-Reflection Films for Metallographic Objectives. James R. Benford. American Society for Metals Preprint 1, 1945, 19 pp.

Experimental studies on improvement in performance of metallographic microscopes due to anti-reflection films on the objective lens surfaces show the improvement to be dependent on the objective design and on the type of specimen viewed. Improvements accomplished by the filming consist of a gain in image contrast and a shortening of the photographic exposure. Photomicrographs are submitted showing comparative performance between filmed and unfilmed objectives. Results are supplemented by observations made with a visual comparator device which enables the observer to view two metallographic microscope images simultaneously. Photoelectric measurements of percentage flares in the images are correlated with the photographic and visual results.

11-91. Adjustable Flush Pin Gage. *Tool & Die Journal*, v. 11, Oct. '45, pp. 123-124.

Simple, fool-proof, yet adjustable gage capable of gaging depths to a maximum of 3 in. basic, and to tolerances of plus (or minus) 0.000 in. to 0.200 in. in steps of 0.001 in.

11-92. Device for Automatic Protection of a Diffusion Vacuum Pump. Theodore J. Wang. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, p. 670.

Simple arrangement described which serves to protect oil in the event of a leak. The scheme consists of utilizing the unbalance voltage developed in a Pirani gage to trigger a thyratron, which in turn opens the diffusion pump heater through a relay. Complete circuit for alternating current operation is shown.

11-93. Lower Inspection Costs With Hard-Surfaced Thread Gages. *Western Machinery and Steel World*, v. 36, Oct. '45, p. 481.

New process for constructing new gages or rehabilitating worn gages differs from all former methods. Life increases of from 5 to 60 times over ordinary tool steel are claimed, results being dependent upon material being gaged and operating conditions. Over a period of several years' use in war plants life increases have averaged approximately 20 times, according to the manufacturer.

11-94. Resolving Power of the Magnetic Electron Microscope. V. E. Cosslett. *Journal of Scientific Instruments*, v. 22, Sept. '45, pp. 170-174.

Factors limiting the performance of electron microscopes, spherical and chromatic aberration, diffraction, imperfections in lens construction. Methods of approach to the correction of aberrations. Even if the mechanical difficulties in lens construction are overcome, a very great reduction in spherical aberration is required to improve the resolution to below 10 A.

11-95. An Instrument for Recording Surface Waviness. *Machinery* (London), v. 67, Sept. 20, '45, p. 327.

Records waviness of a flat or curved surface, as instrument is moved over the face of the test-piece. Contact with the surface is made by a small steel ball set in a sliding spindle. The latter is attached to a recording arm giving a continuous record. A suitable ratio of magnification is 50 to 1, and the record may be magnified again by about 50 when under optical examination.

11-96. Industrial X-Ray Tubes. Z. J. Atlee. *Electronics*, v. 18, Nov. '45, pp. 136-140.

Survey of tubes used today in plants for microradiography with low-voltage beryllium-window types, X-ray diffraction with types having targets lower in atomic number than the material to be examined, and industrial radiography at 50,000 to 2,000,000 peak volts.

11-97. Special Testers for High-Precision Mechanisms. Lan J. Wong. *Instruments*, v. 18, Oct. '45, pp. 676-679, 712.

Extension spring tester, torsion spring tester, torque meter, strobotac calibrator and ball-bearing tester.

11-98. Electric Gaging Methods for Strain, Movement, Pressure and Vibration. Howard C. Roberts. *Instruments*, v. 18, Oct. '45, pp. 685-689, 706, 708.

Calibration-checking circuits; oscillographs.

11-99. Graphic Records Provide Production Analysis. W. J. Cotter. *Production Engineering & Management*, v. 16, Nov. '45, pp. 72-73.

Complete analysis of total production, productive operation time and machine down-time is possible with the record provided by this graphic instrument.

11-100. Microscopy With X-Rays. *Metal Industry*, v. 67, Oct. 12, '45, pp. 231-232.

Overcoming the limitations of the optical microscope. 2 ref.

11-101. Locating Initial Failure in Static Test Specimens. Richard W. Powell. *Automotive Industries*, v. 93, Oct. 15, '45, pp. 28-30.

Ideal instrument for this type of measurement should start to record at the instant of initial failure (or slightly before), should be reasonably portable, should be simple to operate and install, and should have no effect on the strength of the structure. The device described incorporates most of these features.

11-102. Apparatus in Qualitative Microanalysis, Part V. *Metallurgia*, v. 32, Sept. '45, pp. 239-240.

Extraction apparatus for qualitative microanalysis is described.

11-103. A Precision Micropipette to Deliver 0.5 or 1.0 Ml. G. H. Wyatt. *Metallurgia*, v. 32, Sept. '45, p. 240.

A simple, accurate micropipette is described.

12. INSPECTION AND STANDARDIZATION

12-216. Practical Application of Statistical Methods in a Quality Control Program. W. T. Rogers. American Society for Metals Preprint 23, 1945, 23 pp.

Presents examples of the application of statistical methods in a quality control program. Three general methods of handling routine data are discussed: Frequency distributions, control charts, and correlation, with a number of actual examples demonstrating each application. Advantages of the control chart method of presenting data are compared to those of the frequency distribution in both routine and experimental problems, and the inadequacy of the frequency distribution is pointed out. Problems in simple and multiple correlation, taken from actual experience, are presented, with a final example showing the results of a coordination of correlation and control charts. 9 ref.

12-217. Detection, Causes and Prevention of Injury in Ground Surfaces. L. P. Tarasov. American Society for Metals Preprint 26, 1945, 53 pp.

Methods of detecting cracks, stresses and burn in ground surfaces are discussed. Description of cracks and crack patterns that have been observed in practice, including both the cracks that occur spontaneously during or after grinding and the etch cracks that can be developed by suitable etching from stresses introduced into the surface during grinding. Metallurgical factors are considered that have been repeatedly shown to cause hardened steels to be susceptible during grinding to trouble from cracking or from unduly high stressing. Numerous grinding factors are taken up, and specific examples are presented regarding the influence of some of the more important ones upon possible injury to the ground surface. Methods are discussed by which undesirable stresses may be eliminated from ground surfaces after grinding.

12-218. Testing of Precision-Lathe Spindles. G. M. Foley. American Society of Mechanical Engineers Transactions, v. 67, Oct. '45, pp. 553-556.

Describes the development and operation of spindle-testing equipment capable of measuring continuously and at any speed changes in the position of the spindle axis relative to the quill as small as one micro-inch.

12-219. Fluoroscopy of Light Alloy Castings. B. Cassen and D. S. Clark. *Iron Age*, v. 156, Nov. 1, '45, pp. 54-59.

Investigation indicates that the fluoroscope using rotational scanning shows a surprisingly large number of medium and larger defects that are not detected radiographically. Also described is a superior type of protective window to take the place of the conventional lead glass window which discolors.

12-220. Which Screw Threads Are Most Popular? *Screw Machine Engineering*, v. 6, Oct. '45, pp. 43-46.

First steps taken to establish a listing of most used screw threads.

12-221. Statistical Quality Control of Methods and Materials. Edwin G. Olds. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1097-1101.

Process control; how the charts are used; visual defects and their reduction; material-acceptance sampling; applications and benefits. 20 ref.

12-222. Purchasing Castings. L. W. Ball. *Metal Industry*, v. 67, Oct. 5, '45, pp. 210-213.

Method for specifying quality on purchase orders for castings is based on a few simple radiographic illustrations combined with artist's sketches. Maximum acceptable degree of discontinuities based on a statistical analysis of prevailing commercial foundry standards. Method is particularly applicable to light alloy aircraft castings, but is also suitable for all other types of castings and alloys.

12-223. A New Method of Sorting Steels and Other Alloys by Employing the Triboelectric Properties of Metals. Antony Doschek. *Instruments*, v. 18, Oct. '45, pp. 680-681, 710, 712.

Triboelectric effect is observed through the electric current which is generated when two metallurgically dissimilar metals are caused to move in contact with each other. If the two metals are identical, no current is generated and the fact of their identity is thus manifest. Triboelectric voltage values range from a fraction of a microvolt to several millivolts, depending upon the chemical compositions of the metals or alloys in triboelectric union. The friction necessary to produce triboelectrification in dissimilar metals need not be great enough to rupture the surfaces on which tests are made and the disposition of the pieces being tested; i.e., whether or not they are in mechanical and electrical contact with other unlike metals, has no bearing whatever on the validity of the tests.

12-224. Magnetic Particle Detection of Retained Austenite and Carbide Segregation. Richard J. Dooley. *Iron Age*, v. 156, Oct. 25, '45, pp. 46-49.

Before making tools from high speed steel, inspection of longitudinal sections by the wet-continuous Magnaflux method provides a rapid and accurate indication of quality. Shows how segregations and areas with retained austenite are found by this method.

12-225. **The Technique of Macrography, II.** *Chemical Age*, v. 53, Oct. 6 ,'45, pp. 316-318.
Nital type etching media; improved contact prints; macrography of cast iron; copper alloys examined; reagents for aluminum alloys; magnesium and lead alloys.

12-226. **Aviation Inspection at Chevrolet Div. of General Motors.** *Modern Industrial Press*, v. 7, Oct. '45, pp. 26, 28, 30.
Some of the means and methods by which flood of precision-built machines was created.

12-227. **The Advantages and Limitations of Gamma-Ray Radiography on Small Steel Castings.** R. H. Frank. *American Foundryman*, v. 8, Oct. '45, pp. 50-61.
Improved methods of application and better understanding of interpretation standards have resulted in wide acceptance of radiography as an inspection tool and as a means of developing techniques to assure perfection of castings.

12-228. **Industrial Radiography.** *Automobile Engineer*, v. 35, Oct. '45, pp. 415-417.
Some of the important factors in the use of gamma-rays for industrial inspection are discussed.

12-229. **Wheel Tests Establish Standards.** *Production Engineering & Management*, v. 16, Nov. '45, p. 96.
Many factors, pertinent to the efficient operation and manufacture of canvas polishing wheels, have been developed from running tests recently conducted under actual operating conditions.

12-230. **Stress Comparisons by Correlation With High Frequency Magnetic and Eddy Current Losses.** P. E. Cavanagh. American Society for Metals Preprint 3, 1945, 27 pp.
Possibility of using a high frequency oscillator, whose output is governed by magnetic and eddy current losses, to accomplish practical comparisons of stresses in metals. Preliminary experiments described to establish the fact that high frequency core losses do correlate with internal stresses. Practical applications are divided into *(a)* comparisons of stresses arising from cold working and quenching and *(b)* prediction of fatigue failure. 13 ref.

12-231. **Alloy Steel or Alloy-Treated Steel(?)** Henry T. Chandler. *Metal Progress*, v. 48, Nov. '45, pp. 1104-1108.
Recommends that the carbon steels and that standard alloy steels be specified (as in the past) by their chemical analysis, but that no effort be made to specify a chemical analysis for the residual amounts of the reaction alloys when intensified steels are purchased. Their effects should be specified by specifying desired mechanical properties. The classification "alloy treated steels" should be revived.

12-232. **Statistical Quality Control.** John M. Howell. *Aircraft Production*, v. 7, Oct. '45, pp. 475-477.
Some American views on its fundamental concepts.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-36. **Adjustable Voltage Thermostat System.** W. C. Griffin. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, pp. 671-672.
Assembly described devised to be used with any one of several standard laboratory electric heaters, to be flexible in the choice of temperature, compact, and low in cost. With any standard single element heater it gives the effect of having a large fixed heater with a small auxiliary control heater. Circuit devised to supply a portion of the heater voltage continuously with an increased voltage upon demand of the thermostat.

13-37. **Temperature-Control Device for MacMichael Viscometer.** W. A. Rice. *Industrial & Engineering Chemistry* (Analytical Edition), v. 17, Oct. '45, p. 676.
Devised to maintain the sample at constant temperature by immersion of the sample cup in a bath through which water is circulated continuously from a thermostatically controlled reservoir.

14. FOUNDRY PRACTICE AND APPLIANCES

14-321. **Gas Evolution From Cast Steel at Room Temperature.** H. H. Johnson, L. H. Arner and H. A. Schwartz. American Society for Metals Preprint 14, 1945, 24 pp.
Composition and rate of evolution of gas, evolving from freshly cast steel at or near room temperature studied. The gases consist mainly of CO, N_2 and H_2. Electric intermediate manganese steels differ little among themselves in the total of the two former gases evolved per unit weight of steel but vary greatly in the amount of hydrogen. Amount of gas evolved and the rate of evolution increases with temperature. Neither varies significantly with the ratio of surface to volume of the specimen. Rate of evolution varies with the partial pressure of the evolved gases in the ambient atmosphere, but the amount varies but little. Volume of gas evolved is related to time by the equation of the "first order" reaction or by the sum of several such equations. Only a small portion of the H_2 and N_2 recoverable by combustion or by wet analysis respectively is evolved at room temperature.

14-322. **Tellurium Corewashes.** James O. Vadeboncoeur. American Society for Metals Preprint 31, 1945, 6 pp.
Tellurium-base corewashes have solved troublesome gray iron foundry problems. They have been particularly successful in the prevention of shrinks, but care in application must be emphasized since porosity and migrated chills are often the result of careless supervision in preparation and use. Several mixtures used on mass production are described, and the possible mechanism of the action of tellurium in corewashes is discussed.

14-323. **Magnesium Foundry.** *Aluminum & Magnesium*, v. 2, Oct. '45, pp. 31-34.
Careful consideration of all the functions to be performed, bearing in mind the necessity of reducing internal transport and the movement of materials to a minimum, coupled with optimum conditions from an operation and ventilation point of view, led to the type of building and lay-out described.

14-324. **High Tensile Steel for Castings.** W. West, C. C. Hodgson, and H. O. Waring. *Foundry Trade Journal*, v. 77, Sept. 27, '45, pp. 69-76, 80.
Relationship between type of primary structure and mechanical properties; heat treatment; preliminary treatment; hardening; tempering; mechanical properties; chemical composition. 3 ref.

14-325. **Centrifugal Casting Improves Quality.** *Western Machinery and Steel World*, v. 36, Oct. '45, pp. 454-456.
New type centrifugal casting installation is an integral part of its up-to-date foundry equipment recently completed by Axelson Manufacturing Co.

14-326. **Precision-Cast Copper-Base Alloys.** S. Lipson, H. Markus and H. Rosenthal. *Iron Age*, v. 156, Nov. 1, '45, pp. 46-49.
Presents some of the data collected on four copper-base alloys—leaded red brass (85-5-5-5), leaded yellow brass (60-40), high-strength manganese bronze and silicon brass. Procedures and techniques used in casting the test specimens are fully described.

14-327. **Steel Castings Replace Forgings.** E. B. Bromhead and T. E. Piper. *Iron Age*, v. 156, Nov. 1, '45, pp. 50-51.
Generally considered unreliable from a quality standpoint, alloy steel castings are made to aircraft quality standards and prove highly efficient as structural members by virtue of their high weight-strength value.

14-328. **New Foundry Is Model of Mechanization.** *Steel*, v. 117, Nov. 5, '45, pp. 132-134.
New foundry of streamlined efficiency at Ashtabula, Ohio, designed to incorporate the latest development of foundry equipment available in America.

14-329. **Microporosity in Magnesium Alloy Castings.** W. A. Baker. *Canadian Metals & Metallurgical Industries*, v. 8, Oct. '45, pp. 37-38, 40.
Objects of the present investigation were to determine the primary causes of microporosity, to study the contributory factors governing its incidence, and if possible, to develop remedial measures. Sand castings of magnesium-aluminum and other magnesium-base alloys were examined, and in some cases were compared with similar aluminium-base alloy castings. Work was done on a laboratory scale and the test castings were of simple form in order to minimize molding variables and to facilitate examination of the castings. It is evident that microporosity in magnesium alloy castings is primarily due to shrinkage. Suggests remedies.

14-330. **Plaster Mold Castings.** N. B. Barnard. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1085-1089.
Advantages and limitations; typical applications; the future.

14-331. **Pressure Die Casting.** *Light Metals*, v. 8, Oct. '45, pp. 471-478, 515-518.
Answering criticisms of his investigations (and the conclusions drawn from these) by E. Carrington, J. L. Erickson enlarges on his own explanation of the mechanism of metal flow and gas entrapment in pressure dies. Carrington's interpretation of the results obtained by certain continental workers is also questioned. Carrington's reply. 4 ref.

14-332. **Foundries of the Future.** J. B. Lamenzo. *Foundry*, v. 73, Nov. '45, pp. 84-87, 238, 240, 242, 244, 246.
Describes sand conditioning systems in operation in various foundries.

14-333. **Collectors on Cupolas Clean Waste Gases.** Arthur H. Allen. *Foundry*, v. 73, Nov. '45, pp. 88-90, 199, 200.
Gives description of one of the collector units and theory of its action.

14-334. **Physical Testing of Core Binding Materials.** Carl E. Schubert. *Foundry*, v. 73, Nov. '45, pp. 91, 192, 195.
Physical tests when performed correctly do help the manufacturer of core oils to produce even stronger core binders at less cost to the buyer. Also help the purchaser because they act as a check on the quality and uniformity of the core oil being purchased. Suitable tests for both seller and purchaser are outlined.

14-335. **Gray Iron Production for War.** James S. Vanick. *Foundry*, v. 73, Nov. '45, pp. 96-101, 226, 228, 230, 232, 234, 236.
How the gray iron foundry industry of the United States adjusted itself in the shift from civilian to military castings. Paper was prepared for presentation at the first postwar congress of the French Foundry Association in Paris, Oct. 19-20. 2 ref.

14-336. **Malleable Foundry Design.** *Foundry*, v. 73, Nov. '45, pp. 102-105, 156.
Depicts some of the architectural and design features of the malleable iron plant near Danville, Ill., operated by the Saginaw Malleable Iron Division, General Motors Corp.

14-337. **Use of Insulating Pads and Riser Sleeves for Producing Sound Bronze Castings.** Howard F. Taylor and William C. Wick. *Foundry*, v. 73, Nov. '45, pp. 106-111, 260, 262.
Discusses additional applications of insulating pads and risers to eliminate shrinkage. Procedure for making these sleeves and pads is detailed.

14-338. **Foundry Research in the Chilled Car Wheel Industry.** Edwin Bremer. *Foundry*, v. 73, Nov. '45, pp. 112-114, 264-265.
Influence of research in improving the quality of cast iron chilled car wheels is discussed.

14-339. **The Foundry Data Sheet.** *Foundry*, v. 73, Nov. '45, pp. 139-140.
Determining weights of castings from blueprint data; specific gravity and density of common casting alloys; melting points of various materials used in the foundry.

14-340. **Superheating of Magnesium Alloys.** N. Tiner. *Metals Technology*, v. 12, Oct. '45, T.P. 1935, 19 pp.
Presents principal facts concerning the effect of superheating on grain size of magnesium alloys. Attempts made to explain the experimental results in terms of a general hypothesis. Investigations are limited chiefly to common commercial casting alloys. 17 ref.

14-341. **Cylinder Liners for Diesel Engines.** W. W. Levi. *Vancoram Review*, v. 4, Summer, '45, pp. 6-7, 18.
Describes molding practice and specifications for gray cast iron liners.

14-342. **Structure Control of Gray Cast Iron, Part II.** R. G. McElwee and Tom E. Barlow. *Vancoram Review*, v. 4, Summer '45, pp. 8-10, 18-19.
Choice of inoculant, amount to use, methods of adding it, and use in correcting analysis are described.

14-343. **Industrial Status of Precision Castings.** W. A. Morey. *American Foundryman*, v. 8, Oct. '45, pp. 33-38.
Developments in the precision casting process have made possible volume production of small, intricate parts allowing almost unlimited choice of materials.

14-344. **Sand Control in a Malleable Iron Foundry.** Gordon Davis. *American Foundryman*, v. 8, Oct. '45, pp. 65-67.
Different sands used; sand conditioning equipment; sands for light castings; sands for medium size castings; sands for heavy castings; sea coal added.

14-345. **Relative Effect of Lime and Dolomite Fluxes on Cupola Iron and Cupola Operation.** C. C. Sigerfoos and H. L. Womochel. *American Foundryman*, v. 8, Oct. '45, pp. 68-71.
Describes experiments performed to determine the effect of substituting dolomite for limestone as a cupola flux. Data presented to show the effect of the slags on the sulphur, carbon, silicon, phosphorus and manganese contents of the irons, and on their physical properties.

14-346. **Large Aluminum Rotors are Pressure-Cast.** *Product Engineering*, v. 16, Nov. '45, p. 760.
Three sizes of pressure-cast aluminum rotors are shown here: A 5¼-in. rotor used in a 1½-hp., 1800-r.p.m. motor; a 20-in. rotor used in motors of 200 hp.; 30-in. rotor in special purpose 250-hp., 360-r.p.m. motors for the new automotive presses.

14-347. **High Tensile Steel for Castings.** W. West, C. C. Hodgson and H. O. Waring. *Foundry Trade Journal*, v. 77, Oct. 4, '45, pp. 101-104.
Analogies with forged steel provide useful pointers for progress.

14-348. **Die Casting Aluminum.** R. D. McGilvra. *Modern Metals*, v. 1, Nov. '45, p. 20.
Outlines history of the process, as well as some typical applications.

14-349. **The Literature of Die-Castings, Part II.** *Light Metal Age*, v. 3, Oct. '45, pp. 27, 29, 48.
Most complete listing of published material concerning die casting.

14-350. **High Production Casting to Close Tolerances.** Wallace A. Scotten. *Production Engineering & Management*, v. 16, Nov. '45, pp. 67-70.
Successful adaptation of a "lost wax" method of casting non-ferrous metals has enabled the mass production of small and intricate parts without benefit of usually difficult machining operations. Castings are held to finish tolerances.

14-351. **Precision-Cast Copper-Base Alloys, Part II.** S. Lipson, H. Markus and H. Rosenthal. *Iron Age*, v. 156, Nov. 8, '45, pp. 64-73.
Experimental data on precision-cast leaded red brass, leaded yellow brass, manganese bronze and silicon brass are presented and the effects of such factors as flask temperatures and prequench time intervals on the physical properties and microstructure of these castings are discussed.

14-352. **Permanent-Mold Castings.** L. F. Swoboda. *Aircraft Production*, v. 7, Oct. '45, pp. 499-501.
Survey of the advantages of the process; cost and design considerations. (Abstract of paper for Society of Automotive Engineers.)

14-353. **Automatic Casting.** K. Hoffmann. *Metal Industry*, v. 67, Oct. 19, '45, pp. 242-244.
New machine is stated to be suitable for the casting of light metal ingots as well as for the casting of ingots and slabs of lead, tin, zinc, copper and their alloys. (From *Zeitschrift fur Metallkunde*.)

14. FOUNDRY PRACTICE (*Cont.*)

14-354. **Properties of Some Magnesium-Aluminum-Zinc Casting Alloys and the Incidence of Microporosity.** F. A. Fox. *Metallurgia,* v. 32, Sept. '45, pp. 227-228.

The work was done in two parts, the first being concerned with the static mechanical properties of the alloys in the cast and the heat treated states, and the second with the incidence of microporosity in the various alloys in relation to composition. (From Institute of Metals.)

14-355. **The Modern Specialized Foundry.** William Jones. *Foundry Trade Journal,* v. 77, Oct. 18, '45, pp. 135-138, 142.

Features of the foundry; sand mixing, distribution and returns; dust-extraction plant; core department; fettling arrangements.

14-356. **A Study of Molding Methods for Sound Castings.** Frederick G. Sefing. *Foundry Trade Journal,* v. 77, Oct. 18, '45, pp. 139-142.

Discussion on the American Foundrymen's Association Exchange Paper read at the annual meeting of the Institute of British Foundrymen.

14-357. **Substitutes for Silica Flour in the Foundry.** Harold Shaw. *Foundry Trade Journal,* v. 77, Oct. 18, '45, pp. 143-144.

Chamotte; zirconium silicate; molochite; olivine; other substitutes.

15. SALVAGE AND SECONDARY METALS

15-37. **Magnesium Alloy Scrap.** A. G. Arend. *Metallurgia,* v. 32, Sept. '45, pp. 200-202.

From the large tonnages of scrap magnesium alloys which will become available it is suggested that in some cases direct fabrication methods may be applied in which welding and cutting operations will be employed.

16. FURNACES AND FUELS

16-136. **Numerous Processing Ovens Used in Producing Pratt & Whitney Double Wasp Engines.** *Industrial Heating,* v. 12, Oct. '45, pp. 1753-1754, 1756, 1758, 1760, 1762-1765.

Four crankcase shrink ovens were installed in the production lines to eliminate unnecessary handling of parts. These are electrically heated units. Three paint-dry ovens are used. One is 188 ft. long and is steam heated. The other two are electrically heated. Two normalizing ovens for cylinder heads, laboratory ovens for small parts, and truck-loaded box-type ovens for treating connecting rods are some of the other oven equipment in the plant. Describes in some detail representative examples of each type of oven used.

16-137. **A High Temperature Electric Tube Furnace.** J. W. Gartland. Electrochemical Society Preprint 88-11, 1945, pp. 123-134.

Details of construction of a practical, electrically heated carbon tube furnace. Furnace may be rapidly heated to 3000° C., or any lower temperature and held within ±20° C. of any end temperature for several hours. A uniform black body chamber of at least 15 in. length and 2 in. diameter is provided having a capacity of 300 to 500 grams of charge. Volt-ampere characteristics and energy values are given which are valid for the design of larger units.

16-138. **Pit Furnaces at Lukens.** H. S. Hall. *Iron & Steel Engineer,* v. 22, Oct. '45, pp. 81-86.

Of special design, these pit furnaces heat a wide range of slab ingot sizes with excellent results, using natural gas or fuel oil with equal facility.

17. REFRACTORIES AND FURNACE MATERIALS

17-61. **Hot Patching of Open-Hearth Furnaces.** Edwin N. Hower. *Industrial Heating,* v. 12, Oct. '45, pp. 1766, 1768, 1770.

Discusses the present practices employed in the U. S. Steel Corp. plant for hot patching open-hearth furnaces, notably for patching roofs. Condensation of a paper presented before AIME Open-Hearth Committee.

17-62. **Furnace Efficiency Up—Repair Costs Down.** Robert M. Hays. *Western Machinery and Steel World,* v. 36, Oct. '45, pp. 474-475.

Demonstration illustrating the advantages of oil base refractory coatings.

18. HEAT TREATMENT

18-256. **Effect of Variations in Composition and Heat Treatment on Some Properties of 4 to 6% Chromium Steel Containing Molybdenum and Titanium.** George F. Comstock. American Society for Metals Preprint 4, 1945, 30 pp.

Hardness, tensile properties, notch impact resistance, microstructure, weldability, high temperature oxidation, and time for rupture under stress at high temperature, reported for 31 different 5% chromium-molybdenum-titanium steels. 18 ref.

18-257. **Mass Temperature Effects on Quenching 36% Cobalt Magnet Steel.** Benjamin Falk. American Society for Metals Preprint 6, 1945, 21 pp.

Effect of mass on the magnetic properties of a 36% cobalt magnet steel. Purpose was to obtain by heat treatment maximum magnetic values for all commercial sizes of this steel. An empirical relationship between mass and quenching temperature. Mathematical development of this formula is presented, which demonstrates that the empirical relationship is well founded on the concepts of the mass effect evolved by previous investigators, and possesses some measure of physical significance. 19 ref.

18-258. **Induction Hardening and Austenitizing Characteristics of Several Medium Carbon Steels.** D. L. Martin and W. G. Van Note. American Society for Metals Preprint 17, 1945, 36 pp.

Hardenability and austenitizing characteristics of the following medium carbon steels were studied: SAE 1050, 1350, 2350, 4160, and NE9255, and the results discussed in their relation to the induction hardening characteristics. Effect of alloying elements and microstructure on the induction hardening characteristics is described. The steels with low Ac_1-Ac_3 temperatures, little or no free ferrite, and medium to deep hardenability are ideal for surface induction hardening. Of the five steels investigated, the SAE 1350 and 2350 come closest to these specifications. Attention has been given to the effect of retained austenite and internal stresses on hardness. 31 ref.

18-259. **Quenching of Steel Balls and Rings.** Victor Paschkis. American Society for Metals Preprint 20, 1945, 30 pp.

Temperature-time-space relationships obtained in quenching steel spheres and cylindrical rings were investigated on the "Heat and Mass Flow Analyzer" at Columbia University. For spheres, general curves are presented, in which the delaying effect of heat of transformation in the range from 480 to 300° F. has been included. In addition a large number of investigations have been carried out in which the change of thermal properties (conductivity and specific heat) with temperature has been considered. For steel rings charts have been developed which show the complete temperature-time-space relationships in rings of any size and material of constant thermal properties. 15 ref.

18-260. **Cold Working and Heat Treatment of a 10-Karat Gold Alloy.** Vernon H. Patterson and B. Nicholas Iannone. American Society for Metals Preprint 21, 1945, 21 pp.

Cold working prior to aging changes the mechanical properties and the corrosion resistance toward certain media. Aging at 600° F. produced the optimum mechanical properties on material cold reduced over 25%, after a solution heat treatment at 1250° F. for an hour, prior to cold working. Aging at 700° F. produced the best results on reductions in thickness less than 25%. Resistance of the alloy to attack by concentrated nitric acid increased at aging temperatures of 700° F. or higher, and appeared to be independent of the degree of cold working prior to aging. Resistance to attack by artificial perspiration depended on both the degree of cold working and the aging temperature. 3 ref.

18-261. **Metallurgical Characteristics of Induction Hardened Steel.** James W. Poynter. American Society for Metals Preprint 22, 1945, 34 pp.

Specimens of SAE 4340 steel, heat treated by induced high frequency (355,000-cycle) electric currents and quenched, have same metallurgical characteristics as furnace-heated and quenched specimens. Depth of hardening is increased by increasing heating times (lower power input) to produce the same surface temperature or by heating to higher surface temperatures with the same power input. Samples containing small carbide particles respond more readily to heat treatment than those in which the carbide particles are larger. No evidence is found to indicate that induction heating results in more rapid solution and transformation rates and in the absence of grain coarsening at higher temperatures. It is believed that the effect of frequency on depth of hardening has been overemphasized since the rate of heat flow also has a definite effect on depth of hardening. 12 ref.

18-262. **A Mechanism of the Surface Decarburization of Steel.** W. A. Pennington. American Society for Metals Preprint 30, 1945, 44 pp.

Study has been made of the decarburization of an ordinary carbon steel of eutectoid composition at temperatures from 1275 to 1700° F. at intervals of temperature which were in general 50° F. A mixture of hydrogen and water vapor containing approximately 20% (by volume) of water vapor was used as a medium to effect the decarburization. Water vapor has been regarded as a reactant and not as a catalyst. Photomicrographs show the progress of decarburization with time at the different temperatures and also the general nature of the phenomenon at the different temperature levels. 22 ref.

18-263. **Heat Treating B-29 Super-Fortress Engine Parts in Mammoth Dodge-Chicago Plant.** *Industrial Heating,* v. 12, Oct. '45, pp. 1658-1660, 1662, 1664, 1666, 1668, 1670, 1672, 1674, 1676, 1678, 1680, 1682, 1684, 1686, 1688, 1690.

Operations include hardening, annealing, tempering, carburizing and nitriding on such parts as center cranks, front and rear cams, accessory-drive gears, stationary reduction-gear supports, oil-pump drive gears, accessory drives and starter shafts, and so on, for a total of 87 different parts.

18-264. **Fabricating and Heat Treating Hollow Steel Propeller Blades at Curtiss-Wright Plant.** *Industrial Heating,* v. 12, Oct. '45, pp. 1702-1704, 1706, 1708, 1710, 1712, 1714, 1716.

Improvements in methods for milling, welding, forming, heat treating and inspection.

18-265. **Rapid Heating to Forging or Heat Treating Temperatures With Gas.** *Industrial Heating*, v. 12, Oct. '45, p. 1778.

By completely combusting large amounts of gas in small burner volumes, and grouping many such burners in "patterned" banks closely surrounding the work, remarkable rates of heat transfer into steel have been achieved.

18-266. **Precision Treatment of Tools and Dies Is Specialty of Akron Steel Treating Co.** *Industrial Heating*, v. 12, Oct. '45, pp. 1790-1792, 1794.

Operations include high speed and carbon steel hardening, tempering, annealing, normalizing and other routine treatments. Views of the interior of the plant are shown.

18-267. **How Heat Treatment Affects High Strength Irons.** C. R. Austin. *American Machinist*, v. 89, Oct. 25, '45, pp. 118-120.

Annealing for stress relief; annealing for improved machinability; quenching for hardness; interrupted quenching; martempering.

18-268. **Effect of Assembly Aging on the Properties of Several Aluminum and Magnesium Alloys.** G. R. Bailey and Max E. Tatman. *Aluminum & Magnesium*, v. 2, Oct. '45, pp. 24-25, 29.

Attempts to answer some of the questions concerning effects on the physical properties and corrosion resisting characteristics of various materials and alloys that might comprise a reproduction assembly, if artificially age hardened with the clad 24S aluminum alloys at 375° F. for 6½ hr., or with the new 75S at 250° F. for 24 hr.

18-269. **Corrosion Resistance of Heat Treated 24S Aluminum Alloy.** Charles Nagler. *Aluminum & Magnesium*, v. 2, Oct. '45, pp. 26-29.

Investigation reveals that the hardness, tensile strength, and elongation when produced in heat treatment is independent of the speed of quench from the solution treatment temperatures. The salt water corrosion resistance as measured by the immersion test is dependent on the speed of quench from the solution temperature.

18-270. **Gas Carburizing.** Ernest S. Kopecki. *Iron Age*, v. 156, Nov. 1, '45, pp. 60-63.

Bright carburizing, the restoration of carbon to a decarburized surface and the heat treatment of carburized parts are discussed. How to select correct gas carburizing equipment is also considered.

18-271. **Improved Machinability Claimed in Steel Bars That Are Continuous Hardened by Induction.** *Screw Machine Engineering*, v. 6, Oct. '45, pp. 47-49.

Bars inductively hardened reveal improved machinability while heat treatment costs are, in most cases, lower by 50% than those for conventional methods long considered standard. An actual saving of $15 per ton is possible.

18-272. **Don't Make Your Conversion Answers Too Hard.** Lawrence R. Foote. *Industrial Gas*, v. 24, Oct. '45, pp. 13-14, 32, 34.

Lead pot furnace, with adaptations, was selected after a thorough study by a Midwest manufacturer for heat treating high quality small hand tools. Revised method of heat treating showed an average increase in production of better than 300% over the former method. Also it provided a heat treating method which was low in initial investment, low in maintenance cost, flexible and foolproof in operation.

18-273. **Eclipse Counterbore Has Efficient Heat Treat Department.** Gerald Eldridge Stedman. *Industrial Gas*, v. 24, Oct. '45, pp. 15-17, 35-36.

Industrial gas is used in the Eclipse heat treat department, supplying heat to ten furnaces which perform the following functions: Cyaniding, liquid carburizing, carburizing, drawing and annealing. The gas used is 100% natural, with an approximate 1030 B.t.u. content and is piped to the plant by a 6-in. main. The general technique in the carburizing furnaces is standard. They perform the function of heat treat for the relief of strains and stresses. These furnaces attain temperatures of 1650° F. and are fired by six jets, set in opposite stagger.

18-274. **High Speed Metal Heating With Burners Radiant Ceramic.** Harry W. Smith. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1074-1078.

Ceramic-supported combustion, as pioneered in the Selas ceramic burner, and its revolutionary achievement in speeding the heat treatment and heating of metal parts.

18-275. **The Heat Treatment of Steel Castings.** *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1127, 1129.

Annealing; normalizing; quenching; compound heat treatments. Includes effects of heat treatment of steel castings.

18-276. **Gas Carburizing.** Ernest S. Kopecki. *Iron Age*, v. 156, Oct. 25, '45, pp. 52-58.

Reactions of the various atmospheres used in carburizing process are described. Control of soot precipitation and the physical and chemical factors involved in gas carburization are discussed.

18-277. **New Heat Treat Chemicals Replace Critical Materials.** William M. Sutherland. *Western Metals*, v. 3, Oct. '45, pp. 24-25.

Every pound of sodium acid sulphate used in place of sodium dichromate releases approximately the equivalent of one pound of chromium metal for other purposes. A monetary saving is also effected.

18-278. **Production of Whiteheart Malleable Iron by Annealing in Partially Burnt Town's Gas.** I. Jenkins and S. V. Williams. *Foundry Trade Journal*, v. 77, Oct. 4, '45, pp. 91-99.

Annealing time is reduced and difficulties of handling the ore are obviated.

18-279. **Sealing Bronze Pressure Castings Through Heat Treatment.** Fred L. Riddell. *American Foundryman*, v. 8, Oct. '45, pp. 24-29.

Pressure tightness of leaky bushings of gun metal, valve bronze and hydraulic bronze was improved when they were annealed for 3 hr. at 1200 to 1300° F. in an air or oxygen-rich air atmosphere. No sealing whatever took place in a hydrogen atmosphere. When bushings previously improved in pressure tightness by annealing in the oxygen-rich air were re-annealed in hydrogen, the pressure tightness decreased by 25 to 50%. Removing the outer layer of oxide scale after sealing in air did not cause appreciable loss in pressure tightness provided that the bushings were annealed for 3 hr. at the necessary temperature. 7 ref.

18-280. **New Electrode Salt Bath.** *Wire Industry*, v. 12, Oct. '45, p. 533.

Small simplified unit. Compact and of sturdy construction, occupying little floor space, yet capable of being extended as necessary to form a battery of units for treatments which have to be carried out in sequence.

18-281. **Precision Quenching.** Edwin Laird. *Scientific American*, v. 173, Nov. '45, pp. 274-276.

By control of the pressure, temperature, and turbulence of quenching medium, engineers have made it possible to predict, with high accuracy, the exact amount that metals will be distorted by heat treatment. Through use of these methods, machining time can be reduced.

18-282. **Hard Steel Surfaces.** Donald Taylor. *Automobile Engineer*, v. 35, Oct. '45, pp. 401-404.

Some notes on current materials and methods of preparation. Chemical changes; carburizing; gas carburizing; selective carburization; excess stock; sand packing; cement treatment; possible troubles; nitriding; physical changes; deposition; welding and spraying.

18-283. **How Heat Treatment Affects High Strength Irons, II.** C. R. Austin. *American Machinist*, v. 89, Nov. 8, '45, pp. 110-111.

Studies of spheroidization show how the physical properties of irons in the as-cast condition can be changed by annealing.

18-284. **Graphite in Cold-Rolled Subcritically Annealed Hypo-Eutectoid Steels.** M. A. Hughes and J. G. Cutton. American Society for Metals Preprint 13, 1945, 20 pp.

Study was made to determine the effect of (a) temperature, (b) residual alloy, (c) variations in per cent cold reduction, (d) mode of deoxidation, (e) full annealing prior to cold reduction, and (f) carbon content, on the susceptibility to graphitization. Fine grain strip having 0.08 to 0.67% carbon was graphitized when cold-rolled and subcritically annealed. Hot-rolled strip of silico-manganese steel was also graphitized by cold rolling and subcritical annealing. Data presented to show the solution rate of graphite, in cold-rolled annealed strip, at the normal heat treating temperatures. 9 ref.

18-285. **Wax Masking for Selective Copper Plating.** C. E. Ernst. *Metal Progress*, v. 48, Nov. '45, pp. 1099-1101.

A practical, speedy and inexpensive way of stopping off copper when parts are copper plated for selective carburizing. Procedure described.

18-286. **Age-Hardenable Beryllium-Copper.** W. F. Randall. *Engineers' Digest* (American Edition), v. 2, Oct. '45, pp. 511-514. *Wire Industry*, v. 12, April, '45, pp. 195-197.

Precautions to be used and properties which can be expected from heat treatment of copper alloy containing 2.0-2.5% beryllium and up to 0.5% cobalt or nickel.

18-287. **The Application of Ms Points to Case Depth Measurement.** E. S. Rowland and S. R. Lyle. American Society for Metals Preprint 24, 1945, 21 pp.

Method is based upon the change in martensite point temperature with variation in carbon content. Data on nine commercial carburizing steels. Comparisons made between the experimental Ms points derived from this investigation and those arrived at through calculations by means of the published formulae.

19. WORKING

Rolling, Drawing, Pressing, Forging

19-304. **Drawability of Aluminum Alloys at Elevated Temperatures: Part I—Deep Drawing Cylindrical Cups.** Dan M. Finch, Scott Wilson and John E. Dorn. American Society for Metals Preprint 7, 1945, 30 pp.

Deep drawing properties of 3S-O, 52S-O, 24S-T, 24S-T86, 61S-T, XB75S-T and R301-T were evaluated by determining the maximum per cent draw that could be achieved by deep drawing cylindrical cups. Effects of punch radius, die radius, clearance, hold-down load, die temperature, and lubrication on drawability were studied.

19-305. **Deep Drawing Aluminum Alloys at Elevated Temperatures: Part II—Deep Drawing Boxes.** Dan M. Finch, Scott P. Wilson and John E. Dorn. American Society for Metals Preprint 8, 1945, 20 pp.

Results obtained for a limited number of alloys and two temperatures, 70 and 450° F., illustrate decided advantage of deep drawing box-type parts of aluminum alloys at elevated temperature. For all of the alloys tested the maximum height of the box drawn at 450° F., was greater than the maximum height of box drawn at 70° F. For the T temper alloys the square boxes drawn at 450° F. were more than twice the height of those obtained at 70° F. Improvement in drawability at 450° F. as compared to 70° F. was the greatest for the high strength aluminum alloys.

19-306. **Forging Magnesium.** M. M. Moyle. *Western Machinery and Steel World*, v. 36, Oct. '45, pp. 442-445.

Weight and excellent machinability recommend its use to manufacturers and designers. Methods of forging outlined. Table lists the composition and typical properties of the alloys commonly available in this country.

19. WORKING *(Cont.)*

19-307. **Conditions Affecting the Quality of Steel for Cold-Heading Dies.** A. S. Jameson. *Steel*, v. 117, Oct. 29, '45, pp. 98-101, 121-122.
Many quality factors are found difficult to reduce to mathematical exactness due to inability to control variables other than the one being studied. However, correlation is shown between macrostructure and die life.

19-308. **Precision Forging Press.** *Steel*, v. 117, Oct. 29, '45, pp. 128, 149.
Longer die life and considerable increase in production afforded by new high speed forging press.

19-309. **Forging Die Design.** John Mueller. *Steel Processing*, v. 31, Oct. '45, pp. 633-635.
Various basic procedures which will assist the die designer in his efforts to reduce the die costs, and help provide a more satisfactory die life.

19-310. **Recent Engineering Developments Contribute to Greater Stamping Production.** *Steel Processing*, v. 31, Oct. '45, pp. 636-638.
Case histories where stampings have replaced machined parts and substantial savings made.

19-311. **Shot Peening—Some Outstanding Applications.** Henry Fischbeck and Phil Schmitt. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1064-1068.
As applied by Pratt & Whitney Aircraft; basic principles of the process; equipment for shot peening; settings for rocker arms.

19-312. **Some Factors Affecting the Rate of Extrusion of Aluminum Alloys.** T. L. Fritzlen, *Metals Technology*, v. 12, Oct. '45, T.P. 1851, 8 pp.
Discussion on the factors that are subject to technical control. Attempt made to evaluate effect of each factor separately. Discussed in detail under three general headings are: Characteristics of the equipment; size and structure of the ingot; and temperature of ingot, cylinder, and other parts. 11 ref.

19-313. **The Effect of Various Elements on the Hot Workability of Steel.** Harry K. Ihrig. *Metals Technology*, v. 12, Oct. '45, T.P. 1932, 29 pp.
Quantitative hot workability test has been devised and used to determine the effect of oxygen, carbon, manganese, sulphur, selenium, phosphorus, silicon, chromium, nitrogen, nickel, cobalt, molybdenum, vanadium, titanium, lead and tin on the hot workability of steels. Effects on the steels studied given. 15 ref.

19-314. **Spinning Aluminum.** *Modern Metals*, v. 1, Nov. '45, pp. 8-13.
Tells of spinning technique as employed in England, and, in addition, deals with lathes, speeds, chucks, hand tools, blanks, annealing, lubrication and the overall development. (From a Bulletin published by the Wrought Light Alloys Development Association of England.)

19-315. **Stretch-Forming Plus Impact Banishes Joggling Problems.** Douglas Hodges. *Aviation*, v. 44, Nov. '45, pp. 147-149.
By preventing irregularities and permitting closer tolerances in formed and extruded sections after bending, ingenious attachment to punch press has reduced rejections of these critical parts to 1%.

19-316. **Pilot Model Stamping Costs Reduced by Inexpensive Dies.** Ernest C. Morse. *Production Engineering & Management*, v. 16, Nov. '45, pp. 74-76.
Short run dies and spinning chucks can be fabricated from this material at a greatly reduced cost. High abrasive areas on dies can be reinforced and die life extended an appreciable amount by the use of metal facing.

19-317. **"The Sol-A-Die Process"—A Method of Forming Sheet Metal.** A. D. Johnson. *Modern Industrial Press*, v. 7, Oct. '45, pp. 16, 18, 20, 22, 44.
Process has proven so successful that it has been used on more than 500 die sets during the past 2 years to produce more than 25 million dollars worth of sheet metal parts. The bolting flange shown was formerly made in 3 parts welded together at more than twice the weight and 3 times the cost. Process also opens the doorway to low cost production of custom automobile bodies and experimental designs which have been precluded by the high cost of conventional dies, on the one hand, and the high cost of beating out auto bodies by hand over form blocks on the other.

19-318. **Short-Cuts to Higher Production.** Lloyd Lennox. *Modern Industrial Press*, v. 7, Oct. '45, pp. 47-50, 52-57.
Summarizes some of the developments which appear to have wide application.

19-319. **Annealed Aluminum Alloys Respond to Hot Forming.** George Sachs and W. F. Brown. *American Machinist*, v. 89, Nov. 8, '45, pp. 91-95.
Higher forming limits attained for certain aluminum alloys at elevated temperatures result of reaction of lubricant to heat.

19-320. **The Rolling of Metals: Theory and Experiment, Part VI.** L. R. Underwood. *Sheet Metal Industries*, v. 22, Oct. '45, pp. 1719-1724, 1736.
External friction between the rolls and the material.

19-321. **Practical Problems of Light Presswork Production.** J. A. Grainger. *Sheet Metal Industries*, v. 22, Oct. '45, pp. 1739-1746.
Follow-on die work. Design; multiple blanking tools; follow-on blank and pierce tools.

19-322. **Shot-Peening.** *Aircraft Production*, v. 7, Oct. '45, pp. 478-480.
Improving mechanical properties by the shot-blasting process.

20. MACHINING AND MACHINE TOOLS

20-471. **Simplified Tools Designed for Broaching Spline Forms.** H. H. Gotberg. *American Machinist*, v. 89, Oct. 25, '45, pp. 107-110.
Involute splines gain favor as requirements call for stronger and more accurate connections. Design of broaches and methods of spline production outlined.

20-472. **Aluminum Alloy Parts Drilled With Two-Position Set-Up.** Charles H. Bodner. *American Machinist*, v. 89, Oct. 25, '45, p. 111.
Time-saving arrangement steps up production of parts from 60 pieces in 8 hr. to 300 pieces in 8 hr.

20-473. **Universal Fixtures Simplify Radius Lip Grinding.** Arthur Cuppet. *American Machinist*, v. 89, Oct. 25, '45, pp. 112-113.
Development of simple fixtures for use on an Ex-Cell-O tool grinder. Set-ups which have proven satisfactory are shown.

20-474. **Table Feed Increased 15-Fold With Negative-Rake Cutters.** J. Q. Holmes and R. C. Holloway. *American Machinist*, v. 89, Oct. 25, '45, pp. 137-138.
With carefully ground cutters having cushioned carbide-tipped teeth, it is possible to take fairly heavy cuts in alloy steel in one pass and get good finish.

20-475. **Practical Ideas.** *American Machinist*, v. 89, Oct. 25, '45, pp. 139-144.
Slots milled in beryllium-copper tubes without causing deformation. Machining operations shortened by face-plate fixture. Honing machine stones fully utilized by reworking the wedges. Tool for inserting or removing fasteners in difficult places. Bisecting dividers locate centers of large circles. Holes punched in hat section with locator on brake dies. Ends of cylindrical gages ground flat and square with accuracy. Combination saw fixture for cutting unusual shapes. Adjustable tube checking fixture saves fitting time. Collet type indexing fixture for production with accuracy. Self-adjusting vise fixture holds pieces during machining. Arbor bracket adapts milling machine for die sinking.

20-476. **Unique System of Automatic Control Can Handle 39-Function Cycle.** *Steel*, v. 117, Oct. 29, '45, pp. 106-108, 122.
Without depending on conventional cams, it gives precise, high speed repetitive performance over full working range of machine—at same time allowing immediate switch to manual operation without disturbing settings of automatic cycle.

20-477. **How to Remove and Replace Carbide Tool Tips.** *Steel*, v. 117, Oct. 29, '45, pp. 109, 145.
Several methods of removing carbide tips from cutting tools are employed by the various divisions of the General Motors Corp. Such removal of tips offers a means not only of subsequently reclaiming the carbide for application on a different tool or for breaking up and resintering into a new shape, but also permits a new tip to be placed on the same tool shank so that it can be continued in use.

20-478. **Self-Opening Stud Driver.** *Steel*, v. 117, Oct. 29, '45, p. 138.
Incorporates automatic take-up for wear on jaws; affords exceptionally accurate maintenance of projection heights.

20-479. **Precision Boring With Gun Drills.** William Lawrence Lewis. *Western Machinery and Steel World*, v. 36, Oct. '45, pp. 434-437, 479.
By the use of modern, highly developed tool steels and Carboloy cutting bits, an old tool transformed into a new, highly productive one.

20-480. **Machine Tooling at Northrup.** Frank Morris. *Western Machinery and Steel World*, v. 36, Oct. '45, pp. 438-441.
Turret milling head; rotary drill jig cowling flap; cowling skin shear; automatic machine for installing Dzus fastener graumet rings and buttons.

20-481. **Die-Grams.** Karl L. Bues. *Western Machinery and Steel World*, v. 36, Oct. '45, pp. 476-477.
One of many interesting tools which the tool engineers and the toolmakers at the Friden plant have had to create and build to produce a precision product at a reasonable cost.

20-482. **Taylor Instrument Engineers Development of Interesting Turret Lathe Job.** *Screw Machine Engineering*, v. 6, Oct. '45, pp. 52-54.
Case featuring the application of a high speed drilling attachment.

20-483. **Precision Gear Making at Swiss-American Gear Manufacturing Corporation.** *Screw Machine Engineering*, v. 6, Oct. '45, pp. 55-57.
For production turning and threading men.

20-484. **Drilling Small Holes in Stainless Steel.** G. J. Stevens and E. J. N. Lynn. *Screw Machine Engineering*, v. 6, Oct. '45, pp. 58-59.
Stresses, use of proper speeds and feeds, correct drill-jig designs, adequate chip clearance, and selection of a coolant. Modification of the drill-feeding technique is essential for work hardening alloys such as the non-magnetic 18-8 type stainless steels.

20-485. **Tool Abrasion in Machining Ceramics Controlled by Use of Carbides.** *Screw Machine Engineering*, v. 6, Oct. '45, pp. 60-61.
Tools tipped with Carboloy cemented carbide are used for three different classes of work: For turning unfired insulators on lathes; for drilling and counterboring unfired insulators on drill presses; for dies for pressing insulators made of highly abrasive materials.

20-486. **Machine of the Industry: Sheffield Form and Thread Grinder.** *Screw Machine Engineering*, v. 6, Oct. '45, pp. 66-73.
Multi-form wheel dressing; principal operating elements of Sheffield form and thread grinder; attachments for Sheffield form and thread grinder.

20-487. **Surface Broaching in the Production of Gun Components.** *Machinery* (London), v. 67, Sept. 20, '45, pp. 309-315.
Surface broaching has eliminated a number of milling and grinding operations on hammer-plate and has resulted in a reduction of the total machining, bench, and processing times, from 100¼ min. to 62 min. 10 sec.

20-488. **Drilling, Reaming and Centering Feeds for Automatic Screw Machines.** *Machinery* (London), v. 67, Sept. 20, '45, p. 315.
Gives drilling feeds in inches for mild steel and brass.

20-489. **Rolling Threads on Automatics.** *Machinery* (London), v. 67, Sept. 20, '45, pp. 317-322.
One of the most interesting of recent applications of this thread-rolling technique is the production of the 20-mm. shell nose on a 6-spindle automatic. To machine this component at one setting it is necessary accurately to form the nose, and in the same operation to produce 32 tpi. on a ⅝-in. diameter behind the nose. Set-up shown incorporates a thread-rolling attachment. Cycle time per piece is 13 sec., giving an hourly output of 206 shell noses at 75% efficiency.

20-490. **Compound-Angle Holes and Surfaces.** N. P. Skinner and K. L. C. Legg. *Machinery* (London), v. 67, Sept. 20, '45, pp. 323-326.
Discusses the necessary means of machining, including tooling equipment. Theoretical considerations.

20-491. **Hot-Shearing Blades.** A. T. Cape. *Steel*, v. 117, Nov. 5, '45, pp. 140, 178, 180.
Are made to last several times normal life when properly hard surfaced. Method not merely a salvage tool but valuable on original equipment as well.

20-492. **25 Per Second! 1500 Per Minute! 90,000 Per Hour!** *Tool & Die Journal*, v. 11, Oct. '45, pp. 96-97.
New press designed and built to blank and punch sheet metal parts at unprecedented speeds.

20-493. **Centralizing Drill Jig and Milling Fixture.** Alex S. Arnott. *Tool & Die Journal*, v. 11, Oct. '45, pp. 98-101.
Centralizing feature is made up of tool steel locators which are machined to a radius at their outer ends which will conform to the inside contour of the casting, and they are moved radially in and out in a straight line from the center of the jig by the movement of the centralizing plate, a section of which is shown.

20-494. **Blind Hole Tapping.** D. V. Bell. *Tool & Die Journal*, v. 11, Oct. '45, pp. 102-105.
The inherent difficulties in machining internal threads by the tapping method; solution of many of these problems, and newly discovered answer to the old question of how a lubricant reaches the edge of a cutting tool embedded in the material which it is machining.

20-495. **Hand Routing Setups.** *Tool & Die Journal*, v. 11, Oct. '45, pp. 106-107.
Tools, such as drills, rotary files, metal cutting saws, abrasive wheels, grinders, etc., are light enough to be operated without fatigue by a woman and, at the same time, provide excellent service.

20-496. **Machine Tool Control.** Ray A. Stremel. *Electronic Industries*, v. 4, Nov. '45, pp. 102-103.
Form and thread milling machine made fully automatic in operation through addition of vacuum tube control unit.

20-497. **Automatic Operation of Vertical Turret Lathes.** *Iron Age*, v. 156, Oct. 25, '45, pp. 68-69.
Certain structural changes in machine. These, together with the actual Man-Au-Trol unit, have resulted in the production of a new machine of remarkable flexibility.

20-498. **Efficient Polishing of Sintered Carbide Drawing Dies.** Walter Trurnit. *Industrial Diamond Review*, v. 5, Oct. '45, pp. 221-227.
Form or shape of the drawing die hole; new polishing process; requirements for a modern polishing shop. (Translated from *Stahl und Eisen*, v. 64, 1944, pp. 503-508.)

20-499. **Internal Gear-Grinding Machine.** H. Rectanus. *Industrial Diamond Review*, v. 5, Oct. '45, pp. 235-237.
Two flanks, including the space of a tooth, are ground simultaneously. For this purpose the form of the tooth space is cut into the grinding wheel by two diamonds which are securely held on the same lever and which successively true both sides of the grinding wheel. (*Werkstattstechnik und Werksleiter*, v. 35, 1941, pp. 378-382.)

20-500. **Compound-Angle Holes and Surfaces.** N. P. Skinner and K. L. C. Legg. *Machinery* (London), v. 67, Sept. 27, '45, pp. 345-349.
Theory of compound angles, as applied in setting up workpieces for the accurate drilling of holes and production of surfaces discussed. Demonstrates how compound-angle workpieces may be set up in the workshop.

20-501. **Multiple Drilling and Boring Machine Has Hydraulically Operated Feed Table.** *Product Engineering*, v. 16, Nov. '45, p. 739.
Illustrations give details.

20-502. **Greater Threading Accuracy Obtained With New Lead Screw.** *Product Engineering*, v. 16, Nov. '45, p. 743.
Thread accuracy is held to strict specifications by a new principle of tap lead in the Warner & Swasey precision radial threading and tapping machine which has a tapping capacity from No. 8 tap, 36 pitch, to ⅞ in. Lead screw is hardened and precision ground.

20-503. **Fine Pitch Gears Inspection and Tolerances—III.** *Product Engineering*, v. 16, Nov. '45, pp. 758-760.
Presents standard covering a procedure for making comparator layouts for checking profiles of fine pitch gears and worms.

20-504. **Investigation on Cutting-Tool Angles.** M. Littmann and R. Neutmann. *Engineering*, v. 160, Oct. 5, '45, pp. 261-263.
Influence of the shape of the tool on the direction of chip flow discussed. Problem approached from geometrical considerations.

20-505. **These Special Fixtures Speed Engine Mount Output.** Harry Merle. *Aviation*, v. 44, Nov. '45, pp. 152-153.
Picture story of a war-born production-boosting process has profit meaning for peacetime fabrication.

20-506. **Tool Tip Application Speeded by Induction Heating.** T. A. Verner and E. F. Adams. *Production Engineering & Management*, v. 16, Nov. '45, p. 71.
Better adhesion obtained and breakage reduced by use of series coil induction heating for tool tip mounting.

20-507. **Methods and Machines for Precision Gear Checking.** John E. Hyler. *Production Engineering & Management*, v. 16, Nov. '45, pp. 89-92, 94.
Established methods for measuring gears and recent developments in gear checking machines are described.

20-508. **Practical Safety Devices Reduce Shop Accidents.** John T. Smith. *Production Engineering & Management*, v. 16, Nov. '45, pp. 103-104, 106, 108.
Carefully designed machine tool guards, and a six-point safety program adaptable to most types of manufacturing.

20-509. **Profile Templet With Air Follower Whips Tricky Cylinder-Turning Job.** Carl H. Wilmot. *American Machinist*, v. 89, Nov. 8, '45, pp. 102-104.
Floating between a roller and a knife-point stylus, the bar assures increased production and maintains tolerance limits.

20-510. **Extrusions Drilled From End-to-End in Box-Type Stripping Jigs.** Conrad Mattson. *American Machinist*, v. 89, Nov. 8, '45, pp. 106-107.
Center support plates are used to guard against distortion in drilling wide extruded shapes. Special feed and clamp device is attached to cut-off saw unit.

20-511. **Correction Factors Simplify Odd-Tooth Gear Measurements.** *American Machinist*, v. 89, Nov. 8, '45, pp. 108-109.
Elimination of measurement and calculation errors in measuring odd-toothed gear diameters is an important advantage of this method of applying corrections.

20-512. **Practical Ideas.** *American Machinist*, v. 89, Nov. 8, '45, pp. 123-128.
Music wire straightened in lathe with revolving bent brass tube. Checking gage for grinding threading toolbits. Hinged drilling jig aids small drilling and tapping. Collmascope for testing optical windows for impressed strains. Ratchet tool quickly tightens inaccessible hose clamps. Spring center for lathe tapping. Worms cut on plain miller by geared attachments. Automatic electric marker for rapid wire cutting. Multiple-spindle drill head for closely spaced holes. Hydraulic feed unit prevents breakage of drills. Hinged gate permits loading of screw blanks as lathe turns. Piloted end mill improves accuracy and production.

20-513. **Contour Saw Chart for Various Materials—I and II.** *American Machinist*, v. 89, Nov. 8, '45, pp. 129, 131.
Based on the use of hard-edge flexible metal-cutting band-saw blades; the data can also be used for straight sawing, and skip-tooth or buttress-tooth saw blades.

20-514. **Plastics Dies and Punches.** *Aircraft Production*, v. 7, Oct. '45, p. 496.
New method for the cheap and speedy production of press tools.

20-515. **Shop Equipment and Small Tools.** *Aircraft Production*, v. 7, Oct. '45, pp. 497-498.
Some modern aids to efficient production. Cleaning coolant; locating pin; profile-turning roller box.

20-516. **Modern Machine Tools.** *Aircraft Production*, v. 7, Oct. '45, pp. 503-504.
Precision thread chasing; centerless thread rolling; slab milling.

21. LUBRICATION AND FRICTION; BEARINGS

21-86. **Silver-Thallium Anti-Friction Alloys.** F. R. Hensel. *Metals Technology*, v. 12, Oct. '45, T.P. 1930, 14 pp.

Microstructure and physical properties of cast silver-thallium alloys containing up to 10% thallium were investigated. Homogenizing treatments of electroplated alloys eliminate internal stresses, preferred orientation and non-uniform grain size. The diffusion of electroplated thallium into silver is improved by indium. Alloy layers containing 2 to 3% thallium, of a depth of 0.003 in., are produced by carrying out the diffusion process at 600° C. for 6 to 12 hr. in hydrogen. Amsler seizure tests indicate that a 2% silver-thallium alloy has optimum anti-friction properties. Underwood corrosion test has established extremely low rates of corrosion of silver-thallium alloys as compared with silver-lead or copper-lead alloys. 11 ref.

21-87. **Physical Properties of Sprayed Metals.** A. P. Shepard. *Welding Journal*, v. 24, Oct. '45, pp. 937-938.

Specific gravity as a measure of porosity in bearings. Standard procedure for determination; tables of results on various sprayed metals.

21-88. **A New Bearing for Machine-Tool Spindles.** P. E. Burger. *Machinery* (London), v. 67, Sept. 27, '45, pp. 350-351.

Two types of bearings, one in which clearance is self-adjusted by external hydraulic pressure, other is adaptation of Mitchell principle. A definite initial clearance is provided between each pad surface and its shaft in order to allow an oil-film to form.

21-89. **The Determination of Metals in Lubricating Oils.** Louis Lykken, K. R. Fitzsimmons, S. A. Tibbetts and Garrard Wyld. *Petroleum Refiner*, v. 24, Oct. '45, pp. 133-142.

Detailed procedures are given for the determination of lead, copper, cadmium, barium, tin, silica, zinc, iron, aluminum, calcium, magnesium and alkali metals in new or used lubricating oils without interference from other elements such as sulphur, phosphorus and chlorine.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-566. **Manual and Automatic Tracers Require Accurate Templets.** G. V. Slottman. *American Machinist*, v. 89, Oct. 25, '45, pp. 126-130.

Design and application of multiple-type templets are described.

22-567. **Repair of Magnesium Parts by Gas Welding.** *American Machinist*, v. 89, Oct. 25, '45, p. 147.

Generally speaking, such repairs should be considered a temporary measure until a replacement part can be obtained, and deviations from normal practice may be required in order to put the parts back in service quickly. Examples of such deviations are: Use of multiple beads; the welding of sections that are impossible to clean thoroughly; the welding of cast metal.

22-568. **Cutting Under Water.** G. W. Birdsall. *Steel*, v. 117, Oct. 29, '45, pp. 102-103, 136, 138.

Now possible at any depth by simple equipment that cuts steel and other ferrous metals at high speed. Valuable wartime development seen to have important applications in salvage, harbor clearance and certain construction operations. Also advantageous for cutting in air, typical job being done in 66% less time than required by conventional method.

22-569. **Copper Brazing of Incendiary Bombs at Republic Steel Corp. Plant.** *Industrial Heating*, v. 12, Oct. '45, pp. 1722-1724, 1726, 1728, 1730, 1798.

Describes the operations as carried out in the Niles plant, which employed the electric brazing furnace shown.

22-570. **Welded Design Influences Construction of Modern Mine Cars.** Gilbert P. Muir. *Steel Processing*, v. 31, Oct. '45, pp. 630-632.

Welding the truck assembly; fabrication of the body.

22-571. **Some Suggestions for Better Spot Welding.** T. A. Beck. *Steel Processing*, v. 31, Oct. '45, pp. 639-640.

In most cases the rejections can be traced down to the parts themselves. Sometimes it is the steel being dirty or rusty, other times it may be due to the shape of the parts. With good inspection of parts and electrode maintenance, rejections will be cut to a minimum.

22-572. **Applications of Arc Welding in Aircraft Construction.** C. P. Keogh. *Steel Processing*, v. 31, Oct. '45, pp. 641-643.

Essentials for satisfactory welds are: The specified material must be of real welding quality; the minimum thickness of steel should be 17 swg.; acute angles for fillet welds to be avoided unless the material is relatively thick; for outside corner welds one plate should not project past the other by more than the thickness of the plate; sufficient room for the fillet must be provided; fit up of the joint must be accurate and close; machining of weld junction can only be carried out if the work is annealed.

22-573. **Brazing Alloy Tool Tips by Induction Heating.** T. A. Vernor and E. F. Adams. *Steel Processing*, v. 31, Oct. '45, pp. 652-653.

Brazes alloy tool tips onto single point tools in a fraction of the time formerly required with acetylene gas torches. When acetylene torches were used, the tool tip was overheated and several minutes were required to braze each piece. Tool tips can now be brazed on a 1½x1½-in. tool, which is the largest used, in about 30 sec. using induction heating.

22-574. **Hidden-Arc Welding of 13-Gage Steel.** H. E. Cable. *Iron Age*, v. 156, Nov. 1, '45, pp. 52-53.

New welding advancement helps speed production in the manufacture of thousands of watertight metal containers for shipping and storing bombs. Procedure outlined.

22-575. **Current Ranges for Quality Welding.** Orville T. Barnett. *Steel*, v. 117, Nov. 5, '45, pp. 124-125, 158, 160, 162, 164.

Closer limits on current and voltage settings for various types of electrodes are providing better welding results.

22-576. **Combustion Ingenuity Speeds Transmitter-Tube Brazing.** *Industrial Gas*, v. 24, Oct. '45, pp. 23-24.

Rejections and time have been saved by ingenious adaptations of gas-air combustion in replacement of conventional oxy-gas techniques at two vital points of manufacture. First, open rings of special ceramic-cell gas burners have been adapted to silver-braze the heavy copper collar on the flared anodes. Second, an unusual gas-fired furnace serves to keep both the finned-radiator-assembly and the anode of the finished tube uniformly at proper temperature for long periods while cadmium or other solder is being puddled and flowed for perfect bonding of the two elements into one assembly.

22-577. **Low-Tin Solders.** *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, p. 1125.

Properties of solders compared.

22-578. **Arc Welding Electrode Classification.** *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, p. 1131.

System for classifying arc welding electrodes prepared by the American Welding Society and the American Society for Testing Materials.

22-579. **Silver Brazing.** J. P. Weed. *Metal Industry*, v. 67, Oct. 5, '45, pp. 217-218.

Use of silver brazing not only increases production but in many cases improves both the appearance and strength of the job while reducing the weight. (Paper presented to the American Welding Society.)

22-580. **Hard-Facing in an Oil Refinery.** G. W. Nigh. *Welding Engineer*, v. 30, Oct. '45, pp. 41-43.

One of the largest savings in oil refinery maintenance is that made possible by applying hard-facing to areas where the metal surfaces are in sliding contact. Examples show how costly shutdowns are being avoided.

22-581. **Aids to Aluminum Spot Welding.** Norman Grande. *Welding Engineer*, v. 30, Oct. '45, pp. 44-45, 83.

Automatically indexing feed table that positions spots exactly 0.502 in. apart.

22-582. **Good Welds in a Hurry.** Arthur Havens. *Welding Engineer*, v. 30, Oct. '45, pp. 46-47, 53.

Even when time is short and conditions are far from ideal, broken locomotive frames can be satisfactorily arc welded. Examples.

22-583. **Better Jobs from Flame-Cutting.** A. F. Chouinard. *Welding Engineer*, v. 30, Oct. '45, pp. 48-50.

Bevel cuts, tip sizes, problems of multiple cutting are covered.

22-584. **Electrical Characteristics of Spot Welding Machines.** C. L. Railton and A. J. Hipperson. *Iron Age*, v. 156, Oct. 25, '45, pp. 59-64.

Efforts to improve the strength, consistency of results and quality of spot welds have in the past overlooked the importance of throat dimensions. Results of tests reported show that an increase in welding current of 76%, representing an increase in welding heat of 320%, is obtained by using the machine at its minimum throat as against maximum throat.

22-585. **Spot Welding Stainless Steel.** C. B. Smith. *Western Metals*, v. 3, Oct. '45, pp. 13-16.

Shows typical machine setups used for welding stainless steel aircraft parts. Tables give welding machine settings, required weld shear strengths and design data.

22-586. **Proper Hard Facing of Manganese Steel Castings.** *Western Metals*, v. 3, Oct. '45, p. 19.

Summarizes large manganese steel casting problems.

22-587. **Some Developments in Oxy-Acetylene Applications.** G. E. Bellew. *Iron & Steel Engineer*, v. 22, Oct. '45, pp. 62-65.

New processes that have provided methods of increasing production while reducing time and costs.

22-588. **Multiple Arc Simplifies Welding of Aluminum Sheet.** M. R. Rivenburgh and C. W. Steward. *Product Engineering*, v. 16, Nov. '45, pp. 733-735.

Properties of butt welded joints in high strength aluminum alloy sheets, as produced by a new, easily controlled arc welding process; production advantages indicated.

22-589. **Spot and Seam Welding Aluminum, Part II.** O. A. Perry. *Light Metal Age*, v. 3, Oct. '45, pp. 8-11, 46.

Design for spot welding.

22-590. **Light Welding.** *Automobile Engineer*, v. 35, Oct. '45, pp. 409-414.

Machines and methods employed by Vauxhall Motors, Ltd. Methods of welding the cab for a Bedford truck are described in some detail. Data are given for electrode tip diameters and pressures.

22-591. **Brazing—for Strength With Economy.** Lawrence D. Jennings. *Aero Digest*, v. 51, Nov. 1, '45, pp. 70-71, 176.

Method consists of: Selecting the type of joint most suitable for the application in regard to strength, conductivity, and space limitations. Selecting the brazing alloy most suited for the material being joined in regard to brazing temperature, strength of joint, and method of application. Selecting the method of cleaning, mechanical or chemical, and selecting the method of heating.

22-592. **Cost Reduction Aspects of Flame-Cutting Operations.** G. V. Slottman. *American Machinist*, v. 89, Nov. 8, '45, pp. 98-101.

Design of parts, handling of material, and utilization of scrap are cited.

22-593. **Examination of Welded Joints by Trepanning With Special Application to Shipbuilding.** J. B. Arthur and M. H. MacKusick. *Welding Journal*, v. 24, Oct. '45, pp. 895-901.

Cites advantages and disadvantages.

22-594. **The Heliarc Welding Process as Applied in the Aircraft Industry.** Thomas E. Piper. *Welding Journal*, v. 24, Oct. '45, pp. 903-906.

Wing tips, nose-cradle, instrument panel, spoilers, pulley brackets, hydraulic reservoir and many other small parts made of magnesium and aluminum alloys as well as stainless steel collector rings and exhaust stacks are fabricated by Heliarc welding.

22-595. **Railroad Tank Cars of All-Welded Aluminum.** R. E. Haas. *Welding Journal*, v. 24, Oct. '45, pp. 907-909.

Construction of the 31-ft., 4-in. long by 87-in. diameter structures to rigid specifications is made possible by the automatic carbon arc process and manual welding with metallic aluminum electrodes. Tank shell is made up of three pieces of formed aluminum, square sheared and butted to form a joint with a gap of about $\frac{1}{32}$ in. and no greater than $\frac{1}{16}$ in.

22-596. **Some Conclusions Regarding Resistance Welding and Statistical Quality Control.** John Bayard Butler. *Welding Journal*, v. 24, Oct. '45, pp. 909-914.

Groups of resistance welds can be made whose strength characteristics closely approximate a normal grouping. Therefore users of resistance welding equipment should realize that they can apply statistical quality control to the output of their machines and should examine the possibility of using statistical quality control methods to improve their product and increase their output. 9 ref.

22-597. **Spot Welding of Heavy Aluminum Alloys.** C. W. Dodge. *Welding Journal*, v. 24, Oct. '45, pp. 915-921.

Data given and laws propounded have been verified experimentally with hundreds of tests on aluminum alloys on different sized machines. A machine which has a guaranteed range of 0.016 to 0.081 will easily produce optimum welds on 0.032, 0.040 and 0.051 but not on 0.016 or 0.081. A machine whose guaranteed range is 0.032 to 0.125, on the other hand, produces optimum welds on 0.064, 0.072 and 0.081 but not on 0.032 or 0.125. Likewise, a machine having a range of from 0.064 to 0.187 will produce optimum welds on 0.091 through 0.125 but not on 0.064 and 0.187. In every case, where the magnitudes of all factors of a machine could be adjusted to those desired as determined from the above laws to produce an optimum weld, the size and shape of the weld produced was exactly the same as that predicted and the latitude of all adjustments was very wide with little of the undesirable effects described.

22-598. **Some Fundamentals in All-Welded Ship Construction.** Milton Forman. *Welding Journal*, v. 24, Oct. '45, pp. 923-928.

Ship failures; cause of failures; crack arrestors; residual stresses; reaction stresses; stress risers and stress concentrations; workmanship; rigidity; absence of crack stoppers in all-welded ships; wartime operating conditions; S.S. "sea porpoise". 10 ref.

22-599. **Chemical Factors Affecting the Welding Properties of Stabilized 18-8 Stainless Steel.** Franklin H. Page. *Welding Journal*, v. 24, Oct. '45, pp. 929-932.

208 heats of Type 321 titanium-stabilized stainless steel and 36 heats of Type 347 columbium-stabilized stainless steel were rated as to their relative weldability and these results correlated against the chemical composition and other data. Results of this investigation indicate that the cost of welding stabilized stainless steels using oxy-acetylene or atomic hydrogen may be materially decreased by slight changes in the chemical composition within existing specifications.

22-600. **Resistance Welding for Economy and Quality.** Lester A. McIntosh. *Welding Journal*, v. 24, Oct. '45, pp. 933-937.

Problem discussed arose through the necessity of reducing cost and increasing the strength of the front axle support for Ford-Ferguson farm tractors. After several months of development and testing, only one of the many submitted designs compared favorably with the original casting on economy and quality. This new design proved to be a riveted assembly of the rear portion of the support which was made from ¼-in. thick steel and the front portion of the support made from $\frac{3}{16}$-in. thick steel requiring eight ½-in. diameter steel rivets. Front and also the rear portions of this support were each in turn reinforced with a ½-in. steel plate at the axle pivot pin to give a greater area of bearing at this vital point. These two reinforcements each required three ½-in. diameter rivets thus making a total of 14 rivets in the completed assembly.

22-601. **Electric Eye Tracing in Machine Cutting.** Walter Bergerow. *Welding Journal*, v. 24, Oct. '45, pp. 941-948.

Electronically controlled steel cutting as possessing flexibility, accuracy, economy and quality, far superior to conventional methods of guiding machine torches. Intricate shapes or contours, impossible to cut with other types of tracing devices, may be cut to dimension with this fully automatic equipment.

22-602. **The Development of a Welding Laboratory.** *Welding Journal*, v. 24, Oct. '45, pp. 481s-485s.

Weldability of steels; welding electrodes; resistance welding; flame pressure welding; welding techniques; structural welding; gas welding, flame cutting, flame hardening; facilities and equipment; brazing and soldering; personnel in welding research. 11 ref.

22-603. **Effect of Recent Research on the Weldability and Control of the Production of Steel Aircraft Tubing, Part I-II.** Arthur J. Williamson. *Welding Journal*, v. 24, Oct. '45, pp. 485s-496s.

Standard sample—cracking measurements; dilatometer studies; metallographic studies; effect of steelmaking practice—aluminum; aluminum vs. cracking-effect of sulphur; cracking of NE steels; post heating; hardness vs. cracking; steel aircraft tubing.

22-604. **Effect of Phosphorus on the Properties and Welding Characteristics of Arsenical and Non-Arsenical Copper and on Copper-Silver Alloy Filler Rod.** Maurice Cook and Edwin Davis. *Welding Journal*, v. 24, Oct. '45, pp. 497s-506s.

Scope of investigation; preparation of materials; mechanical properties, work hardening and annealing characteristics; physical and mechanical properties of 1% copper-silver alloys; weld tests on $\frac{3}{16}$ in. thick plate; effect of phosphorus content upon grain growth in basis metal; weld tests with copper-silver filler rods of various phosphorus contents.

22-605. **Production Technique and Quality of Flash Welded Joints.** Hans Kilger. *Welding Journal*, v. 24, Oct. '45, pp. 506s-520s.

Influence of upsetting on the fatigue strength; relation between the welding procedure and the properties of the joints; influence of the size and shape of the welded cross section. (Second part of the translation of Fertigungstechnik und GuteAbbrennungschweisster Verbindungen.)

22-606. **The Spot Welding of NE8715, NE8630 and SAE 4340 in the 0.125-In. Thickness.** W. F. Hess, W. D. Doty and W. J. Childs. *Welding Journal*, v. 24, Oct. '45, pp. 521s-530s.

Describes work done in establishing optimum conditions for making tempered spot welds in three different type steels in the 0.125-in. thickness. This work is a continuation of similar investigations on steels of various grades mainly in the 0.040-in. thickness. It is shown that great improvements in the mechanical properties of the welds are obtained through tempering in the welding machine. The greater the hardenability of the steel, the more will the mechanical properties be improved. This process makes it possible to spot weld steels which would be unweldable using conventional methods of spot welding. 6 ref.

22-607. **Instrumentation of the Spot Welder and Investigation of the Spot Welding of 0.091-In. 24S-T Alclad Sheet.** R. C. McMaster and N. A. Begovich. *Welding Journal*, v. 24, Oct. '45, pp. 531s-556s.

Presents preliminary results of a study of the spot welding of wire-brushed 0.091-in. 24S-T Alclad aluminum alloy sheet. Results are typical of those obtained for 0.080 to 0.125-in. sheets. Description is given of a toroid-integrator system used to measure welder secondary current without the loss in energy inherent in a manganin shunt system. A technique is presented for producing sound welds of 2900-lb. shear strength in 0.091-in. material. 7 ref.

22-608. **Photoelastic Investigation of Stress Distribution in Transverse Fillet Welds.** C. H. Norris. *Welding Journal*, v. 24, Oct. '45, pp. 557s-560s.

Object and scope of investigation; description of tests; discussion of test results.

22-609. **Soft Soldering.** Morris E. Fine and Ralph L. Dowdell. American Society for Metals Preprint 9, 1945, 29 pp.

Soldering properties of lead-tin, lead-antimony-arsenic, and other solders. Properties studied were soldering temperature, drossing, fluxing, wetting, alloying, and strength of steel lap joints. 32 ref.

22-610. **Resistance Welding, Part III.** R. W. Ayers. *Aircraft Production*, v. 7, Oct. '45, pp. 490-494.

Survey of the seam welding process and equipment.

22-611. **Portable Spot Welding Equipment.** *Aircraft Production*, v. 7, Oct. '45, p. 502.

Halves number of operations on bomb-door assembly.

22-612. **Projection Welding for Short Runs.** R. O. Klenze. *Machine Design*, v. 17, Nov. '45, pp. 101-106.

Use of inexpensive fixtures on press type resistance welders, in a manner comparable to a punch press with various die sets, makes possible improved design, increased production and lower costs. A wide variety of cast and forged parts can be redesigned for resistance welding. Cost comparisons on some jobs have shown substantial savings on quantities as low as a thousand parts.

22-613. **Welded Airscrew Hubs.** W. M. Imrie. *Engineers' Digest* (American Edition), v. 2, Oct. '45, pp. 502-505. *Aircraft Production*, v. 7, No. 79, May '45, pp. 210-215.

Method of manufacture eliminating waste is to hot-press the hub in halves from plate and then weld these about a center-line by the flash-butt welding process.

22-614. **The Welding of Non-Ferrous Metals, Part VII.** E. G. West. *Sheet Metal Industries*, v. 22, Oct. '45, pp. 1793-1796.

Welding of aluminum and its alloys. 10 ref.

22-615. **Weld Cracks in Mg-Mn-Ce Alloys.** H. Mader and F. Laves. *Sheet Metal Industries*, v. 22, Oct. '45, pp. 1797-1800.

It is known that the mechanical properties of magnesium-manganese alloys are considerably improved by the addition of cerium, which, however, reduces their weldability. Tests have shown that weld cracks can be completely eliminated by the addition of aluminum. If the alloy contains a minimum of approximately 1% aluminum, the sheet is fully weldable. Tendency to weld cracking was investigated by the Fokke-Wulfe clamped-weld test.

22-616. **Furnace Brazing With Aluminum Brazing Sheet.** *Sheet Metal Industries*, v. 22, Oct, '45, pp. 1801-1803.

Consists of an aluminum alloy core with a brazing alloy coating, on one or on both sides, metallurgically bonded to the core. When heated above the melting point of the coating alloy and below the melting point of the core, in the presence of an appropriate flux, a portion of the coating will melt and flow into the nearest capillary spaces.

23. INDUSTRIAL USES AND APPLICATIONS

23-270. **Lead Products.** *Canadian Metals & Metallurgical Industries*, v. 8, Oct. '45, pp. 30-32.

Manufacture involves melting, casting, extrusion, rolling and burning.

23-271. **Mass Producing Rocket Projectiles at Westinghouse Plant.** W. G. Miller. *Industrial Heating*, v. 12, Oct. '45, pp. 1692-1696, 1698, 1700, 1800.

Infra-red drying of forgings; rough-machining operations; induction heating for nosing; heat treating; finish-machining operations; cleaning, painting and assembly.

23-272. **Chase Euclid Case Plant Produces Brass Cartridge Cases and Steel Mortar Shell, Part I.** *Industrial Heating*, v. 12, Oct. '45, pp. 1732-1734, 1736, 1798.

Operations involved in its production briefly described and somewhat detailed descriptions given of the equipment employed in the several steps of the manufacture.

23-273. **Manufacture of Woven Wire Conveyor Belts for High Temperature Service.** Fred L. Hooper. *Steel Processing*, v. 31, Oct. '45, pp. 645-648.

The one direction belt; the sectional belt; the balanced belt; the rod reinforced belts; final inspection; other developments.

23-274. **Materials for Producing the Atomic Bomb.** Kenneth Rose. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1054-1057.

Part played by metal-working plants, engineers and scientists in the development and production of the atomic bomb.

23-275. **The Silicones—Truly New Materials.** Harold A. Knight. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1069-1073.

Heat resistance; high temperature lubricants; silicone rubber; silicone coatings.

23-276. **Aluminum Bonded to Steel or Cast Iron.** M. G. Whitfield and V. Sheshunoff. *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1090-1096.

Process consists essentially of casting light metal, in the usual manner, against a specially prepared steel surface. A bond, formed at the interface of the two metals, has unique properties making it suitable for manufacture of various assemblies such as discharge tubes, radio transmission power tubes, plane exhaust stack heat exchangers, bearings and composite gears.

23-277. **Materials for Peacetime Products: Materials & Methods Manual No. 9.** *Materials & Methods* (Formerly *Metals & Alloys*), v. 22, Oct. '45, pp. 1105-1120.

New alloys—their characteristics and uses. The NE steels; low alloy steels; specialty steels; stainless steels and heat resisting alloys; tool and die materials; hard surfacing alloys; cast iron and steel; copper, brass and bronze; aluminum and magnesium alloys; zinc and its alloys; low melting metals (lead, tin, bismuth, etc.); powder metallurgy materials. Non-metallic engineering materials today.

23-278. **Magnesium on the March.** T. W. Atkins. *Aluminum & Magnesium*, v. 2, Oct. '45, pp. 22, 36, 40.

Magnesium is taking its place beside other time-tried metals, but in the march it will forge ahead as consumers become convinced of its safety, lightness, durability and strength. (Address delivered at Second Annual Meeting of the Magnesium Association.)

23-279. **Light Alloys in Rectifiers, Photocells and Condensers.** *Light Metals*, v. 8, Oct. '45, pp. 479-484, 485-491.

Attention is directed to chemical properties in relationship to metal with which they come into contact.

23-280. **Light Alloys in Structural Engineering.** *Light Metals*, v. 8, Oct. '45, pp. 506-508.

Presents certain of the fundamental factors governing the successful adoption of light alloys for engineering structures. Shows the use to which some of these forms may be put in practice.

23-281. **Aluminum in the Coal-Gas Industry.** *Light Metals*, v. 8, Oct. '45, pp. 520-522.

Exhaustive survey of the theory and practice of the application of light alloys in coal-gas production and consumption.

23-282. **Applications of Meehanite to Die Casting Equipment.** H. K. and L. C. Barton. *Machinery* (London), v. 67, Sept. 27, '45, pp. 356-359.

Erosion of gray iron; structure of Meehanite; increased life of pots; strength of Meehanite castings.

23-283. **Some Applications of Welded Aircraft Tubing.** J. S. Adelson and Park Hill. *Western Metals*, v. 3, Oct. '45, pp. 28-30.

Deals with three types of tubing: Alloy 4130 and 8630 tubing for motor mounts, low carbon tubing for intake tubes, and stainless tubing for exhaust stacks.

23-284. **Aluminum Semi-Trailer.** *Modern Metals*, v. 1, Nov. '45, pp. 18-19.

Tells of a new all-aluminum refrigerated semi-trailer. Weight of the trailer cut 51% by using high-strength aluminum alloys. By eliminating dead, useless weight, the public will benefit by lower operating costs and cheaper maintenance.

23-285. **Aluminum for Boats.** *Modern Metals*, v. 1, Nov. '45, p. 21.

Use of aluminum for boats is rapidly expanding. Outlines additional developments for aluminum in this industry and gives a summary of a survey relative to use of materials in tomorrow's boats.

24. DESIGN

24-98. **Special Analysis of Gear Mesh Clarifies Curvature Conditions.** Ernest Wildhaber. *American Machinist*, v. 89, Oct. 25, '45, pp. 122-125.

Duplex generation method gains in popularity and corrects bias bearing of gear teeth. Necessity of special gear blanks is shown in this concluding installment.

24-99. **Design Analysis of Messerschmitt Me-262 Jet Fighter, Part I.** John Foster. *Aviation*, v. 44, Oct. '45, pp. 115-135.

First detailed engineering study of Germany's top jet propelled fighter reveals many unorthodox design and construction features and shows the importance of the production engineer in its development.

24-100. **Theory of the Involute Gear.** R. Stanley Wright. *Western Machinery and Steel World*, v. 36, Oct. '45, pp. 457-459.

Best gear design for a desired speed change is a compromise of the following points: Pressure angle, the best portions of involute curve, available cutters, and gear finishing processes. Considers smooth running gears from the point of view of the theoretical designer.

25. MISCELLANEOUS

25-125. **Tomorrow Is Today for the Magnesium Industry.** Edw. S. Christiansen. *Aluminum & Magnesium*, v. 2, Oct. '45, pp. 21, 51.

Employment opportunities will gradually be offered to thousands of workers, and our standard of living will eventually be raised through the introduction of many labor and energy-saving applications for magnesium. (Address delivered at Second Annual Meeting of the Magnesium Association.)

25-126. **Aspects of Magnesium That Invite Investigation.** Anthony Cristello. *Aluminum & Magnesium*, v. 2, Oct. '45, pp. 23, 40-41.

Fire hazard in machining; surface treatments for magnesium; new alloys.

25-127. **Metallurgical Progress.** L. Sanderson. *Mine & Quarry Engineering*, v. 10, Oct. '45, pp. 252-254.

Various interesting developments in metallurgical field summarized.

25-128. **Aircraft Engine Metallurgy Since World War I.** Walter E. Jominy. *Steel*, v. 117, Nov. 5, '45, pp. 128-129, 192, 194, 196, 198-199.

Materials discussed are magnesium, sodium, silver, lead plate, indium plate, beryllium, stainless steel, columbium, titanium, selenium, chromium plate, sintered bushings, sintered carbides, molybdenum high speed steel, nitralloy steel, forged aluminum, heat treated aluminum castings and high temperature alloys. Processes or tests discussed are nitriding, grain size control, development of S-curves and hardenability testing, induction hardening, magnaflux testing, furnace atmosphere control, hydrogen brazing, hardness testing with Rockwell machines, shot blasting, and quantitative spectrography.

25-129. **Steel Strapping Method.** *Steel*, v. 117, Nov. 5, '45, pp. 135, 172, 174, 176.

Developed by Navy materials handling laboratory for safeguarding ordnance materials against rough wartime handling; it is equally suited to many industrial packing problems.

25-130. **Versatile All-Steel Conveyor.** *Steel*, v. 117, Nov. 5, '45, p. 147.

Employs novel method of linking steel plates.

25-131. **Report on Wartime Electronic Developments.** *Electronics*, v. 18, Nov. '45, pp. 92-93.

Describes electronic systems, equipment and components developed during the war.

25-132. **Dielectric Heating Fundamentals.** Douglas Venable. *Electronics*, v. 18, Nov. '45, pp. 120-124.

Power requirements, thermal losses, characteristics of the load, and types of networks for matching the load to the oscillator are discussed.

25-133. **A Workable System for Developing New Products, I.** Ralph F. Bisbee. *Finish*, v. 2, Nov. '45, pp. 18-21, 54.

Presenting a product development system that has worked successfully for both wartime and peacetime products. Includes a description of the system from the earliest inception of a product idea to final testing of its shipping characteristics.

26. STATISTICS

26-148. **Magnesium Industry Surveys Postwar Problems.** *Aluminum & Magnesium*, v. 2, Oct. '45, pp. 18-20, 55.

Problems on how to make the transition discussed at two-day session of the Magnesium Association's second annual meeting.

26-149. **Future of the British Light Alloy Foundry Industry.** W. C. Devereaux. *Foundry*, v. 73, Nov. '45, pp. 92-95, 146, 148, 151.

Some of the problems facing aluminum and magnesium foundries of the United States find their counterpart in this discussion of the outlook in the British light alloy foundry industry. Article is from the eighth Edward Williams Lecture, presented at the annual general meeting of the Institute of British Foundrymen.

26-150. **Lithium—Its War and Postwar Uses.** *Western Metals*, v. 3, Oct. '45, pp. 20-22.

Sources; discovery and development; lithium since World War I; size of industry; lithium in war industry; lithium in air-sea rescues; postwar uses.

26-151. **Wartime Supply and Consumption of Steel.** *British Steelmaker*, v. 11, Oct. '45, pp. 428-429.

Statistics relating to operations of the iron and steel industry during the War.

26-152. **The Steel Trade in War—Part II.** Charles D. Rigg. *British Steelmaker*, v. 11, Oct. '45, pp. 430-432.

Cartel imports; American and dominion imports; imported scrap; comparison with prewar production.

26-153. **1944 Rail Output Highest in 15 Years.** *Railway Engineering and Maintenance*, v. 4, Nov. '45, pp. 1127-1128.

Largely open-hearth steel.

26-154. **Tight Supply Situation in U. S. for Balance of Year Envisioned by WPB Lead Official.** John J. Croston. *Metals*, v. 16, Oct. '45, pp. 6-11.

Lead consumption running above supplies; at end of 1945 government will have 65,000 tons in stock.

26-155. **Dwindling Tin Supplies and the Problem of Reconversion Facing the United States.** *Metals*, v. 16, Oct. '45, pp. 12-15, 17.

WPB issues comprehensive survey of situation and concludes that control over consumption of metal must be continued.

26-156. **Copper and Zinc in Plentiful Supply for Reconversion; Tin and Lead Still Tight.** *Metals*, v. 16, Oct. '45, pp. 18-21, 29.

Krug says country well on way to solving postwar problems; trade ponders new metal stockpiling bill.

27. NEW BOOKS

27-160. **Metallurgy.** Carl G. Johnson. Second edition, 262 pp., illus., American Technical Society, 850 E. 58th St., Chicago 37, Ill. $2.50.

Properties of metals and tests to determine their uses; chemical metallurgy; producing iron and steel; physical metallurgy; shaping and forming metals; some commercially important non-ferrous alloys; light metals and alloys; copper and its alloys; steel; heat treatments for steel; surface treatments; alloy or special steels; classification of steels; powder metallurgy.

27-161. **High Frequency Transmission Lines.** Willis Jackson. 159 pp., diagrs. (Methuen's Monographs on Physical Subjects) Transatlantic Arts, Forest Hills, N. Y. $1.80.

The properties of transmission lines and their applications in high frequency technique.

27-162. **Collision Processes in Gases.** Frederick Latham Arnot. 2nd edition. 112 pp., diagrs. (Methuen's Monographs on Physical Subjects) Transatlantic Arts, Forest Hills, N. Y. $1.50.

27-163. **Atom Smashers; a Story of Discovery.** Raymond Francis Yates. 182 pp., illus., diagrs., Didier, New York, N. Y. $2.00.

A simplified explanation of the theories of physics leading up to the atom bomb.

27-164. **Electronic Equipment and Accessories; Principles of Electronics and Their Applications in Industry.** Ronald Claude Walker. 401 pp., illus., diagrs., Chemical Publishing Co., Brooklyn, New York. $6.00.
Introductory electronics for practical engineers, mechanics, students and other readers who know the elements of electricity and magnetism.

27-165. **Principles of Physics—3 Optics.** Francis Weston Sears. 323 pp., illus., diagrs., Addison Wesley Press, Cambridge, Mass. $4.00.
The physical principles of optics; a college textbook.

27-166. **Theory of Structures.** Stephen Timoshenko and Donovan Harold Young. 502 pp., diagrs., McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $5.00.
A development, with graded problems, of the methods of analysis of trusses and frames, from a basic knowledge of mechanics.

27-167. **Introduction to Industrial Chemistry.** William T. Frier and Albert C. Holler. 382 pp., illus., diagrs., McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $3.00.
A textbook for industrial night schools, beginning with elementary chemistry and going on to a simplified explanation of chemistry's applications in industry.

27-168. **The Art of Calculation.** Harry Sticker. 256 pp., Essential Books. $2.00.
Basic method of arithmetical calculation.

27-169. **Atomic Energy for Military Purposes.** Henry DeWolf Smyth. 264 pp., illus., Princeton University Press, Princeton, N. J. $2.00.
The official report on the development of the atomic bomb under the auspices of the United States Government, 1940-1945. A republication, with slight modifications, of the official report issued by the Manhattan District.

27-170. **Minerals of Might.** William O. Hotchkiss. 206 pp., Jaques Cattell, Lancaster, Pa. $2.50.
A history of minerals and their influence on civilization.

27-171. **Evaluation of Effects of Torsional Vibration.** 576 pp., illus., 8½x11 in., Society of Automotive Engineers, 29 West 39th St., New York 18, N. Y. $10.00.
Experimental and analytical methods used by research departments of a number of leading diesel engine manufacturers in investigating and applying means of controlling torsional vibrations. Prepared at the request of the Navy by a special committee of the SAE War Engineering Board and 17 industrial experts.

27-172. **Chemistry for Electroplaters.** C. B. F. Young. 205 pp., Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. $4.00.
Designed to give the electroplater a fundamental knowledge of the theories underlying chemistry and definitions relating to electroplating.

27-173. **Magnetism.** Edmund Clifton Stoner. 2nd edition, 143 pp., diagrs. (Methuen's Monographs on Physical Subjects) Transatlantic Arts, Forest Hills, New York. $1.25.
Many of the sections have been rewritten and some new sections have been added.

27-174. **Coyne Electrician's Handbook, a Reference and Data Book.** 348 pp., diagrs., Coyne Electrical School, 500 S. Paulina St., Chicago 12, Ill. $2.75.
The essential formulae, charts, tables and code rules of the electrical field.

27-175. **Electronics for Electricians and Radio Men; an Instruction and Reference Book.** 442 pp., illus., diagrs., Coyne Electrical School, 500 S. Paulina St., Chicago 12, Ill. $4.95.
Electronic controls, measurements and processes for manufacturing, commercial and home installations.

27-176. **Coyne Electrical and Radio Dictionary, With Symbols.** 172 pp., diagrs., Coyne Electrical School, 500 S. Paulina St., Chicago 12, Ill. $0.50.
An up-to-date compilation of electronic terms, abbreviations, illustrations and symbols.

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the ASM. Ads are limited to 50 words and only one insertion of any one ad will be printed. Address answers care of ASM, 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated.

POSITIONS OPEN

ENGINEER OF TESTS: To take charge of commercial and industrial structures and materials tests. M.S. degree and lab. exp. desirable. Opportunity to work for doctorate. Salary $3000 or more for 12 months depending on exp. One month vacation with pay. Testing lab. of eastern university. Box 12-5.

RESEARCH ENGINEER: To work on industrial research program in testing laboratory of eastern university. Elect., mech., or civil eng. degree and exp. in matls. testing and vibration theory desirable. Salary $3600 or more depending on exp. Box 12-10.

RESEARCH FELLOWS: To work half-time on industrial research programs and study half-time for M.S. or Ph.D. degree at eastern university. Salary $1080 for 12 months together with freedom from tuition fees. Extra compensation during summer months may be obtained by working full time. Box 12-15.

SALES ENGINEER: To sell alloy steels in northern Ohio and surrounding territory. Headquarters in Cleveland. Man 23 to 35, with automobile, who has studied engineering. Exp. in steel mill, machine shop or heat treat plant preferred. Salary plus expenses to start. Box 12-20.

TOOL DESIGNER: Either grad. engr. with exp. in tool designing for continuous roll form shapes, or person familiar with trigonometry and calculus, and able to do simple drafting work. Knowledge of aluminum or metals helpful. Box 12-85.

ENGINEER: Exp. in aluminum forgings. Graduate engr. familiar with all phases tooling, production, design on aluminum forged parts. Box 12-90.

METALLURGIST: Skilled in metallography. Must be familiar with all types of metals. Consulting and selling. Excellent opportunity for right man. Location middle west. Box 12-240.

METALLURGIST: Must have exp. in fer. met. Give age, training, exp., ref., and recent photograph. Raymond E. Seymour, Industrial Research Institute, University of Chattanooga, Chattanooga 3, Tenn.

METALLURGIST: Interested in the possibilities of powder met. wanted by eastern manufacturer to supervise met. and chem. research work most of which has to do with the manufacture and application of metal powders especially iron powders. Good opportunity in industry with unlimited possibilities. Box 12-290.

POSITIONS WANTED

METALLURGIST: Non-ferrous, broad exp. in copper, aluminum, magnesium alloys. Melting, casting and fabricating. Dev. work, supervision of chem., phys. and spectrographic labs. Age 42. Married, ambitious, best of health. Box 12-25.

METALLURGIST: Exp. in heat treatment of iron and steel, control of matl., metallog., service failures. Research on induction hardening, flame hardening, cutting and carburizing steels. Age 33. Eastern U. S. Box 12-30.

HEAT TREAT FOREMAN: 4 yrs. exp. in supervision of hardening dept. specializing in hardening of tools and dies. Metallographer. Age 26. Box 12-35.

METALLURGIST-CHEMIST: Age 40, 17 yrs. varied exp. in manu. of steel products. Process control, lab. testing, production heat treat and supervision, alloy steels and armor plate. Exp. with metal forming, pickling, painting and plating, welding. Customer complaint and contact. Good personality and initiative. Box 12-40.

CHIEF METALLURGIST: B.S. Ch. Eng. Failure investigations, research in welding and heat treat. Two published articles on met. topics. Railroad and heavy machinery exp. Age 30. Box 12-45.

ASSISTANT CHIEF METALLURGIST: Southern Cal. Exp. in research met., trouble shooting on steelmaking problems, customer complaints, forge and stamping problems, dev. of steel making practice. Capable supervisor. Box 12-50.

METALLURGICAL ENGINEER: B.S. degree. 2 yrs. shop exp., heat treat, electric and gas fired furnaces; 3 yrs. steel foundry exp., development, quality control on stainless grades, austenitic manganese; report writing, failure anal., customer complaints. Supervision of chem., phys. testing, radiographic labs. Age 29, family. Location Midwest. Box 12-55.

METALLURGIST: Age 28, Met. E., M.S. Met. E. discharged from Navy, desires employment in sales, sales development or production. Three yrs. steel mill met. exp. and three yrs. naval service. Good practical and academic background in production, application of strip steel products and wrought aluminum alloys. Box 12-60.

FOUNDRY METALLURGIST: B.S. Met. Eng., age 25, single; 3½ yrs. ferrous and non-ferrous exp. in large automotive foundries. Handled research, devel., and foundry control melting problems. Desires sales eng., service, or contact position; willing to travel. Hard worker. Box 12-65.

METALLURGICAL ENGINEER: Married, young, ambitious. B.S. degree Met. Eng. 4 yrs. exp. ferrous and non-ferrous met., research, spectroscopy. Some knowledge X-ray diffraction, radiog., oil lab. Past 3 yrs. in supervisory capacity. Capable of establishing and supervising complete lab. Desires responsible position as met., research engr., or sales engr., Milwaukee area or West coast. Box 12-70.

SALES ENGINEER: Extensive exp. drop forgings, foundry, machine shop and heat treat. General knowledge of met. Thorough exp. working out problems and shooting trouble between forge shop and machine shop. Contacts principally in State of Michigan, Detroit, and Toledo, Ohio. Box 12-75.

HEAT TREAT SUPERVISOR: 4 yrs. college work, met. training. 12 yrs. diversified exp., heat treat ferrous and non-ferrous; selection and recommendation of matls., production control and shop problems. Progressive, efficient. Location immaterial. Box 12-80.

ASSISTANT METALLURGIST: For foundry. Exp. inspection of metals for Navy, various foundry skilled jobs. Desires position in quality or production control requiring knowledge of specs., inspection and met. procedures. Box 12-95.

INDUSTRIAL MANAGER: Long exp. plant operating, production, indus. eng., estimating, product development, labor relations, plant layout, purchasing, modern procedures. Can deliver results you want in production and profits. Box 12-100.

GRADUATE METALLURGIST: Age 27, married. Exp. in process eng. and development, non-ferrous and gray iron foundry met. control. Desires position in ferrous met., foundry or heat treat control, development, or research. Midwest preferred. Box 12-105.

METALLURGIST: 6 yrs. exp. carbon and alloy steel forgings, gray and malleable iron castings. Supervisory, investigational and developmental exp. leading to lowered costs and increased production. Desires supervisory or general met. work for progressive company. Salary commensurate with responsibility. Would consider foreign assignment. Box 12-110.

LABORATORY TECHNICIAN: Metal production or refining. Exp. supervision, packaging eng., elect. installation and service. Grad. technical college. Age 29. Box 12-115.

METALLURGIST: Ferrous, rolling or bearing company. Exp. heat treat carbon, alloy, stainless, high speed steels. Specialized in treating dies, mandrels, forgings, tools. Metallog. lab. or sales service investigations. Technical reports. Box 12-120.

METALLURGICAL ENGINEER: Long exp. in met. phases aircraft construction, petroleum refining and pressure vessel construction; steel specs. Exp. includes matl. selection, fabrication methods, inspection procedures, heat treat, surface protection, corrosion controls; lab. tests and investigations. M.S. degree. Box 12-125.

CHIEF METALLURGIST: Phys. met., research or production. Prefers tool or tool steel industry. Exp. phys. met. Naval station. Specialist in tools and tool steels, production and research. Supervised pilot heat treat plant, foundry met. control, indus. X-ray, welding, and metallog. investigations. Age 34. Box 12-130.

ASST. PHYSICAL METALLURGIST AND METALLOGRAPHER: Ferrous or non-ferrous. Exp. large aircraft research and development lab. A.B. degree plus tech. training. Ambitious single woman in thirties. Prefers greater New York area. Box 12-135.

METALLURGICAL ENGINEER: B.S. degree, age 24, married. 3 yrs. exp. in eng. dept. of manufacturing concern as matls. engr. Prefers Pacific Northwest. Salary $3000 min. Box 12-140.

METALLURGICAL ENGINEER: Metal fabrication. Exp. supervision of heat treat, die casting, plating and painting; chem. anal., phys. testing, melting and metal control. B.S. Ch.E. Box 12-145.

METALLURGICAL ENGINEER: Production control and research. Exp. gas engr. testing, inspecting and research in gas equipment. Ordnance officer in Navy responsible for maintaining adequate quantities and types of guns and mounts, insure proper repair. Second in command of about 400 men. Age 32. Box 12-150.

FOREMAN: Inspection of metals, heat treating, plating. Exp. supervision and training of inspectors and heat treaters. Familiar all types precision instruments and gages. Age 35. Box 12-155.

METALLURGIST: Ch. E. degree. Newly released from Navy where he enforced contract specs. in aircraft firm. 10 yrs. exp. met., metallog., miscroscopy, photomicrography, pyrometry. Age 31. Box 12-160.

METALLURGIST OR SUPERINTENDENT: Foundry, gray iron, ferrous, non-ferrous. Age 34. Exp. met., supervision of melting, chem. and met. labs., research chemist. Box 12-165.

SUPERVISOR: Met. grad. Successful 7-year record with present employer in supervision, production, costs, development and trouble shooting. Exp. melting, forging, heat treat and machining tool and alloy steels, work rolls, sleeves and general steel products. Wants responsible charge of personnel, production and development work or customer contact work. Box 12-170.

METALLURGIST: B.S. in Mech. Eng. 18 yrs. foundry and steel mill exp., ferrous and non-ferrous. Specializing in refining non-ferrous metals, quality control, failure anal., customer complaints, phys. testing and general supervision of lab. Box 12-175.

METALLURGIST: B.S. degree. 2 yrs. exp. in ferrous and non-ferrous work, stainless steels. Exp. metallog. and heat treat, research on surface finish, surface softening. Matls. eng. supervising lab. Navy Ensign vet. Prefer small manufacturer in East or North Central with responsibility in lab. or research work. Box 12-180.

HEAT TREAT FOREMAN: Or metallurgist. Knows and uses all types of heat treat equipment; expert on quenching dies. 8 yrs. exp. Age 39. Box 12-185.

METALLURGIST-CHEMIST: Over 20 yrs. varied executive, research, consulting and control exp., ferrous and non-ferrous. Authority on processing, selection and applications of eng. matls. Capable planning, organizing and directing research, development or control labs. Progressive and creative thinker. Desires responsible connection with medium-sized concern having good postwar prospects. Box 12-190.

METALLURGICAL ENGINEER: Ph.D., age 27. 2 yrs. exp. teaching and research, 1½ yrs. rocket development. Would like industrial or fundamental research job in field of phys. met. Detroit-Cleveland-Buffalo area preferred. Available Jan. Box 12-195.

PERSONNEL DIRECTOR: Exp. in personnel, safety, employment; accounting and bonus work; selling and collections. Prefers South. Age 49. Box 12-200.

MATERIALS AND PROCESS ENGINEER: Prefers job in small, growing concern in university city. Exp. supervision of group doing research, development and control work on aircraft matls., mainly steel and non-ferrous alloys. Research in hardenability. Box 12-205.

EXECUTIVE ENGINEER: Age 41, grad., professional. Considered authority on machinery development, research and design. Full knowledge of steel (rolling mill) equipment: excellent ref.; many patents. Creative, original, aggressive and easy to get along with. Box 12-210.

CHIEF METALLURGIST: Small company, ferrous. M.S. degree. Exp. product met., cold heading wire, low, medium carbon and alloy heading wire; research on tungsten carbide wire dies. Age 36. Box 12-215.

HEAT TREAT FOREMAN: Age 42; 25 yrs. exp. met. and heat treat work; 16 yrs. as supervisor in met. dept. of large automobile plant; 4 yrs. as general foreman of heat treat dept. in aviation plant. Good ref. Box 12-220.

LIBRARIAN: 16 yrs. exp. met. and eng. labs. Rare metals, hard carbides, steel. Patent and research records. University training. Box 12-225.

METALLURGICAL ENGINEER: 26, B.S.E. in Chem. Eng. and M.S. in Met. Eng. Chinese. Desires position with company having plans in postwar indus. development in China. Free to travel and available immediately. Box 12-230.

METALLURGICAL ENGINEER: Age 26, married, university grad., B.Sc. degree. 12 yrs. exp. ferrous met. with supervisory work, eng., consulting, trouble shooting, experimenting, and development in heat treat, metallog., phys. testing, hot and cold working of steels. Desires steel sales, heat treat supt. or met. Available now. Box 12-235.

METALLURGICAL ENGINEER: Six yrs. exp. as foreman of heat treat with large tractor co. 4 yrs. exp. in supervising control lab., dealing with ferrous, non-ferrous, and stainless steels. Exp. in plating, Parkerizing and lubrication control. Desires connection as chief met. or supervisory capacity with progressive co. offering good future. Box 12-245.

RESEARCH METALLOGRAPHIST OR METALLURGIST: Young woman with several yrs. exp. as chief research metallographist in large elec. indus. Extensive practical and theoretical knowledge ferrous and non-ferrous met. and all metallographic phenomena. Grad. leading tech. school. Prefer Penn. or eastern location. Ref. Immediately available. Box 12-250.

VETERAN—NAVY: Excellent background in heat treat and met. lab. work. Desires position as lab. technician. Has no exp. in sales but has appearance, personality and background if opportunity exists along metal lines. Box 12-255.

METALLURGIST: B.S. degree, veteran, desires work in sales eng. or development and research work with Al, Mg, or alloy steel manufactures. Training consists of 1½ yrs. Al ingot production and recent work in research. Any part of the country or abroad. Age 28. Box 12-260.

PRODUCTION ENGINEER: 10 yrs. indus. exp., including 5 yrs. in advancement of production methods and organizational improvement for aircraft mfr. Desires position with small co. to plan and organize for high production. Prefers aircraft, aircraft engine or mechanical accessories indus. Box 12-265.

SUPERVISOR—Capable of taking charge of the production work of a drop forging concern; well qualified as a leader, can do estimating, die designing, and maintain forging equipment through many years of practical experience; had ample technical training in metallurgy, drafting, and supervising of personnel. Box 12-270.

CHIEF CHEMIST AND METALLURGIST: Exp. in aircraft co., 42, married. Ph.D. (organic). Would consider position in lab., eng. or production. Box 12-275.

METALLURGIST: B.S. Chem. Eng. 20 yrs. exp. in production heat treat small parts to specs., carbon and alloy steels, Al alloys, small carbon steel tools and high speed steel. Chem., phys., micrographic and magnetic testing. Customer contact and specification writing. Box 12-280.

SALES ENGINEER: 6 yrs. exp. as metallurgist responsible for melting in large co. operating gray iron foundries. One yr. exp. analytical chemist. Age 31. Good personality. Available for interview in New York area. Will move. Box 12-285.

SALES REPRESENTATIVE: 20 yrs. exp. merchandising-advertising. Some university training in met. and chem. Background in indus. marketing, understanding of metal working and producing industries. Interested in opportunity and permanency where an analytical and creative sales mind and sincere effort can be rewarded. Northwestern Ohio and lower Michigan territories—Toledo headquarters. Age 40. Let's arrange an interview. Box 12-295.

HEAT TREAT SUPERVISOR: 28 yrs. exp. in heat treat. Installed modern equipment and lab. control in last job. Progressive and practical. Can furnish references. Box 12-300.

WANTED: Electric Variable Speed Drive, as follows: Single, driving DC motor, 200 HP, 230 volts. Variable voltage DC Generator, 200 KW, 230 volts. Synchronous motor 300 HP, 550 volts, 3 phase, 60 cycles, with full automatic starter. Necessary DC voltage regulator and speed control devices to give a speed variation of 6 to 1 ratio. Motor driven exciter for the above.
Box 12-1.
THE METALS REVIEW, 7301 Euclid Ave., Cleveland 3, Ohio

WANTED

Complete sets of Metal Progress, bound or unbound, for 1942 and 1943.

Address
LUCIEN I. YEOMANS
205 West Wacker Dr. Chicago 6, Illinois

NEW PRODUCTS IN REVIEW

60-CYCLE INDUCTION HEATER

Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.

Use of standard resistance welding machine components as simple 60-cycle induction heaters at a Detroit tank plant has lowered the floor-to-floor time of heating suspension arm bores for the shrink fitting of serrated spindles from 35 min. per piece to 2½ min. per piece. At the same time, a cold treating process for shrinking the spindles for final assembly in the bores has been completely eliminated. The shrink fits obtained with the new process are actually so strong that conventional press equipment available in the plant will not separate the pieces after cooling.

The job consists of heating the 50-lb., chromium-molybdenum steel suspension arms—ten arms being needed in each medium heavy tank—for shrink fitting the spindles into the bores of the arms. The bore has a 4½-inch diameter with 92 serrations. Each spindle, of course, has the same number of serrations which must be perfectly aligned after assembly. To permit the spindle to be inserted, the diameter of the bore must be increased some 0.011 to 0.012 in. This requires that the suspension arm be heated up to 500° F., but not more than that. If this temperature is exceeded, the metallurgical characteristics of the metal will be altered.

Engineers of the Progressive Welder Co., in studying the production requirements of this job—a relatively slow heating rate and a large mass of metal to be heated uniformly to a limited temperature—recommended the use of 60-cycle induction heating. While the use of induction heating at power line frequencies (60 cycles per sec.) is not new, the present interest in high frequency induction heating (10,000 to 500,000 cycles per sec.) has overshadowed the possibilities of 60-cycle induction heating for operations where high surface heating rates (with minimum penetration of heat into the workpiece) are not the criteria.

Progressive made up the 60-cycle induction heating equipment from standard components and sub-assemblies of Progressive welding machines—such as welding transformers, air cylinders, control units, etc.—taken from stock.

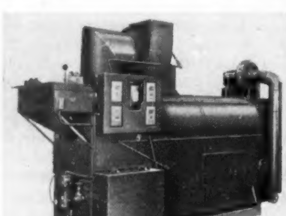
The resultant machine—designed to heat the bores of two suspension arms simultaneously—is actually a combination of a standard "Progressive" 100-kva. welding transformer, a simple air cylinder, stock control units, etc. A copper current-carrying "loop" to enclose the workpieces was arranged so that one section of it can be raised and lowered by the air cylinder to permit the insertion and removal of the suspension arms. This loop—when closed and with current flowing through it—sets up an intense alternating magnetic field within that portion of the workpiece adjacent to the loop. This alternating magnetic field generates the heat within the part necessary to produce the required temperature and expansion. Transformer and conductors are water cooled as in standard resistance welding machine practice in order to utilize the equipment to its maximum capacity. The machines operate from ordinary 60-cycle, single-phase, 230-volt factory power lines.

Mention R-381 When Writing or Using Reader Service.

RINSING AND DRYING MACHINE

Optimus Equipment Co., 171 Church St., Matawan, N. J.

A new machine especially designed for the rinsing and drying of screw machine or small stamped parts, has been announced by this company. This screw-drum type machine is versatile in its applications. It can be used for washing and drying, or rinsing and drying, or any part of these operations. It is also adaptable to a wash-drain, rinse-drain, cold or hot air dry operation sequence.



This equipment can also be adapted for pickling operations. The air stream passes through heater and blower, providing for either or both cold and hot air blast system. Air loss is avoided by completely enclosed dryer end. The various parts of the machine are readily accessible for lubrication, maintenance, or alterations and cleaning such as might be required in hard water areas. Centralized lubrication may be provided.

Mention R-382 When Writing or Using Reader Service.

INDUSTRIAL HEATING ELEMENTS

Bryant Heater Co., 17825 St. Clair Ave., Cleveland, Ohio.

Long a prominent producer of domestic gas heating equipment, Bryant announces the establishment of an Industrial Division to handle the development and distribution of gas combustion components for industrial and process equipment.

Activity in the division, which is intended to round out the Bryant position in the gas industry, is centered on the development of an improved line of mixers, injectors, burners and specialized gas combustion equipment.

Initial products are announced as being a new proportional mixer (Bryant Flomixer); high and low pressure injectors (Hijectors and Lojectors); tunnel burners, combustion blowers, and open-type burners and cages. Basic design work on a number of the new products is nearing completion and volume production of certain parts will be reached by the first of the year.

The Industrial Division is under the direction of Donald A. Campbell, who has specialized in gas and combustion engineering since his graduation from the Engineering School of the University of Colorado in 1916.

D. A. Campbell

First employed as an engineer with the Doherty Plant Survey Group, Mr. Campbell has served as superintendent of the Pueblo Gas & Fuel Co., the Salina Gas & Electric Co., and as general superintendent of the Danbury & Bethel Gas & Electric Co. At this time he transferred from product engineering to sales engineering as industrial sales engineer for Empire Gas & Fuel Co. In a short time he became manager of industrial sales for the Kansas City Gas Co. From 1929 to 1939, Campbell was engaged in application engineering of gas combustion equipment for the Eclipse Fuel Engineering Co., Rockford, Illinois. Prior to joining Bryant in 1944, he was New York district manager of Wheelco Instruments Co.

Campbell is a member of the American Society for Metals, the American Gas Association, the Midwest Industrial Gas Sales Council, and the Advertising Club of New York.

Mention R-383 When Writing or Using Reader Service.

HAND TACHOMETER

George Scherr Co., 200 Lafayette St., New York 12, N. Y.

New precision hand tachometers to enable engineers to read accurately the revolutions per minute of any revolving equipment, are announced by this company. These tachometers operate on the centrifugal principle. The new models have five speed ranges covering a wide range of speeds.

To change speeds, Scherr provides a knurled ring for speedy shifting. The four models are: Model A, from 30 to 12,000 r.p.m., B from 45 to 18,000 r.p.m., C from 60 to 24,000, and D from 120 to 48,000 r.p.m. It is thus possible to obtain the speed of generators, combustion engines, belts, elevators, transmission pulleys, power plants, textile machines, pumps, lathes, etc.

Scherr tachometers gain their extreme precision from the fact that each dial is individually calibrated for each instrument. The finest results may be obtained and revolving shafts can be measured as close as 1 r.p.m. In the Model A, the hand reads to 1 r.p.m. and fractions of one revolution may be estimated. In the 100 to 400 range each graduation shows 5 revolutions, in 300 to 1,200 ten revolutions; in the 1,000 to 4,000 range each line is 50 revolutions while in the 3,000 to 12,000 range each graduation is 100 revolutions. Attachments are also provided to give feet per minute.

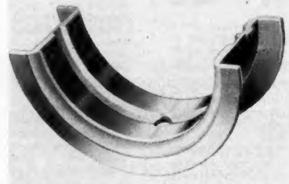
Mention R-384 When Writing or Using Reader Service.

ENGINE BEARINGS

Moraine Products Div., General Motors Corp., Dayton, Ohio.

A peacetime product developed just previous to the war and catapulted into the war picture because of its durability, Durex-100 engine bearings will be produced in quantities for motorcars and trucks.

Powder metallurgy technique forms the basis for producing the Durex-100 bearing. It is essentially a steel-backed lead base babbitt-lined bearing. There is, however, an additional intermediate layer of a metallic sponge-like structure, or matrix, copper brazed to the steel back into which the babbitt is cast. This babbitt, which was specifically developed for this bearing, is a corrosion resistant high lead alloy.



The matrix is formed on the steel in a continuous strip process by sintering a mixture of pure copper and nickel powders to the steel strip. During the sintering process, these metallic powders form an alloy, producing the matrix structure. The thickness of this matrix is held to close limits by a subsequent passing of the strip through sizing rolls.

After the forming of the matrix, the strip is passed through a special vacuum impregnating and casting machine, which fills all of the pores with babbitt, plus a sufficient excess layer over the matrix to allow final machining of the bearing to finished precision dimensions, holding a very thin overlay over the matrix surface in the finished bearing. The babbitt alloy is not only bonded chemically, but because of the porous nature of the matrix, it is held in place mechanically.

The combination of this babbitt alloy with the sintered matrix produces a bearing having advantages that are not obtainable in other types of bearings. Some of the advantages are high conformability, high imbedability, greater resistance to fatigue cracking, high resistance to corrosion, and a higher melting point.

Mention R-385 When Writing or Using Reader Service.

SODIUM HYDRIDE PROCESS FOR DESCALING METALS

E. I. du Pont de Nemours & Co., Wilmington 98, Del.

Culminating years of laboratory research and mill experience, Du Pont announces a sodium hydride process for descaling metals—in a sense an alkaline pickling bath which requires no electric current.

The process has many advantages, particularly for the stainless steels. These include a shorter time for descaling, elimination of the possibility of pitting the metal through careless practice, and saving of 2 to 3% of the steel which may be lost through the action of acid.

The scale, reduced by the sodium hydride dissolved in fused caustic, virtually is blasted from the surface of the metal by the generation of steam in a subsequent water quench. Only a few seconds' dip in acid to brighten the surface remains to be done. The sodium hydride bath is effective on such metals as nickel, cobalt, and copper as well as on alloy and stainless steels.

Nine advantages of the process have been tabulated from experience: (1) The bath, containing active sodium hydride, penetrates throughout the work and uniformly descales all surfaces. (2) All grades of alloy steels can be descaled and different grades can be descaled interchangeably using the same procedure. (3) There is no loss of metal. (4) No harm can result from too long treatment; the hydride bath will not pit the work. (5) Since the bath does not attack metal at its working temperature, an ordinary low carbon steel tank can be used. (6) No electric current is necessary. (7) The working temperature of 700° F. is sufficiently low that there is no deleterious effect on the structure of the metal. (8) The hydride bath does not produce hydrogen embrittlement of the steel. (9) Savings in time, space, and disposal of waste residue are important items.

Sodium hydride dissolves in molten caustic and the solution reduces iron oxide to metallic iron. The sodium hydride reacts with the scale to form caustic soda, which is the material comprising the bath itself. Thus, no undesirable impurities are added to the bath and the metal walls of the tank are not attacked.

In the first large installation based on laboratory experience, the caustic tank was 4 ft., 10 in. by 15 ft., 5 in. Six generators to supply the caustic bath continuously with sodium hydride were mounted in the tank along one side. A gas inlet tube passes through the cover of each box and delivers hydrogen into the generator near the bottom. Hydrogen is obtained by dissociating ammonia in a standard dissociator. After dehydrating the bath, a concentration of 1.5% sodium hydride is built into it.

A steel water tank located about 6 ft. from the caustic tank is used for quenching the work. Exhausters in the wall above the water tank serve as ventilators.

Hot rolled rod is suspended on a horizontal rack and submerged in the fused caustic bath for 15 min. On removing the work and quenching it in the water tank, most of the scale is removed. The remaining reduced material which gives a gray matte appearance to the surface is then quickly removed by a one to two-minute dip in 10% nitric acid, after which the work is washed and dried in the usual manner.

Mention R-386 When Writing or Using Reader Service.

VARIABLE PLATERS

Rectifier Div., Richardson-Allen Corp.,
15 W. 20th St., New York 11, N. Y.

New general purpose line of rectifiers is announced for the field of electro-chemical applications, such as electroplating, electro-cleaning, electro-anodizing, electro-descaling, electro-pickling, electro-color plating, and for general laboratory use.

The first three models, all designed around the selenium rectifier, operate at 25 amp., 6 volts, convection cooled, 14 in. high by 8 in. wide by 12 in. deep; 37/75 amps., 12/6 volts; and 75/150 amps., 12/6 volts, fan cooled, 22½ in. high by 14 in. wide by 14 in. deep, respectively.

The output is continuously variable from zero to full load by one control with complete overload protection. The variable platers, both single and double units, provide automatic protection against fan failure and ventilation restrictions on fan cooled units. They can be either wall or bench mounted, and can be combined to increase power.

In that portion of the d.c. power field in which selenium rectifiers are not quite so applicable, Richardson-Allen is prepared to supply units which utilize the latest types of vacuum tubes. The individual application will dictate whether the tubes used are high vacuum, mercury vapor or inert gas types.

Mention R-387 When Writing or Using Reader Service.

LOW-CARBON FERROMANGANESE

Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York 17, N. Y.

A new special low carbon ferromanganese is produced in the maximum 0.10% carbon grade. A typical analysis is manganese 90% min., phosphorus 0.06%, carbon 0.06%.

The high ratio of manganese to undesirable elements in this special low carbon ferromanganese makes it particularly useful for adding manganese to stainless steel and other quality steels where high purity is essential.

Mention R-388 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

METALSORTER

Farmer's Engineering & Mfg. Co.,
1549 Brushton Ave., Pittsburgh 21, Pa.

A new instrument, the Femco Metalsorter, Type AX, quickly identifies and sorts pure metals, steels and nonferrous alloys. It is portable, very simple to operate, of rugged construction, requires no special electrical power supply and makes nondestructive tests on finished products.

The Metalsorter employs the triboelectric effect. A metallic specimen of standard, known or acceptable character is rubbed against the surface of an unknown or doubtful piece. If a chemical or metallurgical dissimilarity of the two pieces exists, a minute electrical current is generated and is registered by an indicator on a calibrated scale. When there is no dissimilarity, no electrical current is indicated.

The control unit of the Metalsorter contains a thyratron operated timing circuit, an electronic bias supply and a measuring circuit. A reciprocating tool is connected to the control unit by means of a multiple conductor cable and plug. The tool is provided with a specimen holding chuck and a flexible lead for connection to the metal to be tested.

Various fixtures, tools and connector leads are standard accessory equipment to enable the Metalsorter to use almost any shape of metallic part for a reference standard.

When the Metalsorter is carried from one place to another, the tools and accessories are housed in the control unit cabinet. The entire instrument is enclosed in a canvas, felt-lined cover. Weight complete is about 40 lb.

Since the Metalsorter test is absolutely non-destructive, it may be applied to the identification of built-up machinery and aircraft assemblies and structures. The fact that the pieces being tested are in metallic and electrical contact with adjoining members does not affect the accuracy.

Mention R-389 When Writing or Using Reader Service.

METALLIZING GUN

Metallizing Engineering Co., Inc.,
38-14 30th St., Long Island City 1, N. Y.

This Metco type Y metallizing gun, unlike the hand gun, is designed and built specifically for mechanical mounting and continuous operation. Features include the use of 3/16-in. wire — a revolutionary innovation, which, when combined with an acetylene pressure of only 15 psi., more than doubles any previous spraying speeds.

The Metco type Y gun, because it is designed with a total disregard to weight and size limitations necessary for the hand gun, is much heavier and much more rugged in construction. Gears, worms and bearings, several times larger than any used previously, virtually eliminate wear and replacement. This, coupled with lower operating and maintenance costs, effects considerable savings.

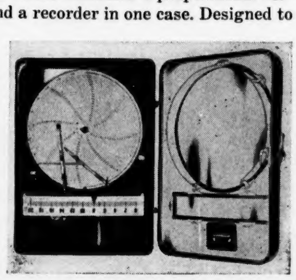
Another improvement—"fluid lubrication"—and a built-in forced feed pump which has no parts to wear assure an adequate supply of lubricant to all bearings regardless of operation position. The gun is non-sensitive to gas and oxygen pressure variations as much as 10 lb. either while lighting or while spraying.

Mention R-390 When Writing or Using Reader Service.

CURRENT INPUT CONTROLLER

Bristol Co., Waterbury 91, Conn.

New electric type controller combines a proportional current input controller and a recorder in one case. Designed to provide extremely accurate control of electrically heated furnaces and ovens, this new instrument provides on-and-off type control with the further advantages of proportioning control.



A rotating cam interrupts the flow of current to the heating coil or coils, the duration of which is determined by the departure of the controlled temperature from the control point. Complete details are given in Bulletin PB1226.

Mention R-391 When Writing or Using Reader Service.

EXPLOSIVE RIVET

E. I. du Pont de Nemours & Co., Wilmington 98, Dela.

An explosive rivet especially adapted to meet the needs of peacetime mass production methods is the latest development in the explosive type of "blind" fasteners used extensively by the aircraft industry during World War II. They are fastened in place by firing a small explosive charge within the shank of the rivet.

Retaining basic features of previous types, the improved design eliminates the necessity for close tolerance drilling and provides rivets which will accommodate a wide range of metal thicknesses. These features are in direct contrast to those of the explosive rivets supplied to aircraft manufacturers where precision tolerances and a wide variety of lengths were required.

After explosive rivets are in place one person applies the tip of an electrically heated iron to the rivet heads. Heat fires the explosive charge within approximately 2 sec. The shank of the rivet is expanded to fill the hole completely and a barrel-shaped head is formed on the "blind" end to lock the rivet securely in place. The strength of these rivets is only slightly less than that of conventional solid rivets.

These improved rivets are now provided in ⅛, 5/32 and 3/16 in. diameters, and will be produced in additional sizes. They are made of various materials including several aluminum alloys, brass, copper, mild steel and Monel metal.

Mention R-392 When Writing or Using Reader Service.

NEW ELECTRODES

International Nickel Co., Inc., 67 Wall St., New York, N. Y.

A new welding electrode for making machinable welds in cast iron has been designated by the trade name Ni-Rod. Another new electrode is the "133" 80-20 nickel-chromium electrode for welding the Inconel side of Inconel-clad steel. Besides these, six other electrodes are now being produced at the new Bayonne Electrode plant. Gas welding rod and uncoated wire for submerged melt welding are produced at the Huntington Works of the company.

The six types of electrodes are designed for Monel, Inconel, nickel, "L" Nickel, "K" Monel, 70-30 cupro-nickel, and the various clad steels. Among them is another new product, "132" a.c.-d.c. rod for Inconel. The Bayonne Works also produces fluxes for gas welding and brazing of these materials.

Production follows the same pattern for all types of electrodes and is carried out in automatic equipment, beginning with the mixing of the flux, following through the slug press, loading into the magazine of the flux extrusion press and passage through the new 90-ft. multiple-pass conveyor oven.

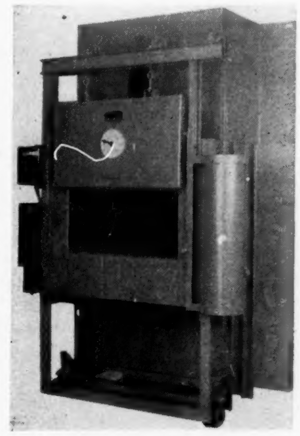
Each electrode passes through the oven, back and forth, five times, starting from the top and discharging at the lowest level end. Maximum capacity of the plant is over 1000 lb. of electrodes an hour.

Mention R-393 When Writing or Using Reader Service.

PORTABLE FURNACE

Despatch Oven Co.,
619 S.E. Eighth St., Minneapolis 14, Minn.

How the installation of a compact, portable furnace eliminated a complicated arrangement for the preheating of magnesium sheets was recently demonstrated at the Consolidated Vultee Aircraft Co., Benbrook, Texas.



Operations required the preheating of magnesium sheets before pressing and forming. To do the required preheating, Despatch engineers designed a furnace of simple but effective design. Portability was one of the prime factors so the furnace was provided with large easy-rolling casters on which the unit could be moved from one press brake to another as operations demanded.

By introducing heat into the furnace from the top and the bottom and with recirculating ducts on both side walls, uniformity of within ± 5° F. was obtained. This system allowed even heating of the sheet whether in a flat condition or in a partially formed shape in event the entire forming operation could not be completed in one press operation.

Smooth, fast operating vertical lift doors at each end of the furnace permit rapid handling of the sheets in order to prevent cooling before forming. Doors are arranged so they seal up against the furnace body when in closed position keeping heat from the operator. By having a fan of large capacity, over 40 air changes per min. are obtained in the furnace. This assures fast uniform preheating and increases production.

Mention R-394 When Writing or Using Reader Service.

NEW LABORATORIES

Industrial Chamberheat Laboratories,
48 Hewlett St., Roslindale, Mass.

Walter G. Grabeau, formerly in the industrial engineering division of General Electric Co., has opened laboratories consisting of (1) customers' sample heat treating division; (2) oven division; and (3) furnace division.

Mention R-395 When Writing or Using Reader Service.

READER SERVICE COUPON

CHECK THESE NUMBERS FOR PRODUCTION INFORMATION AND MANUFACTURERS' CATALOGS

Use this convenient method to obtain further information on items of interest to you in THE METALS REVIEW. The following numbers refer to the new products, manufacturers' literature and advertisements in this issue.

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The Metals Review, December 1945

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MANUFACTURERS' CATALOGS IN REVIEW

Polishing and Deburring

McAleer Mfg. Co., Industrial Finishing Div.
Rochester, Mich.

A new, illustrated, 24-page industrial finishing reference manual on "Polishing, Buffing and Deburring" has been issued by McAleer. For the man who uses or specifies industrial finishing materials, this booklet tells when and where to use what compositions, summarizes and interprets applications and offers helpful suggestions for present-day finishing of all types of metals, non-metals and plastics.

Mention R-396 When Writing or Using Reader Service.

Mounted Point Utility Kits

Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa.

Complete line of mounted point utility kits for industry is described in this bulletin. Utility kit MP21 contains 20 mounted wheels and points and an electrolon dressing stick 5x5x½ in., for dressing the points and altering shapes for special applications. Three additional kits are described, each featuring carefully selected mounted wheels and points, of first grade, industrial quality materials, mounted on stainless steel mandrels, 1½ in. long by ⅛ in. diameter. They are usable on all high speed grinders whether air, electric or flexible shaft.

Mention R-397 When Writing or Using Reader Service.

Comparoscope

Compar-Instrument Co.,
16179 Hamilton Ave., Detroit 3, Mich.

An optical instrument for evaluating surface finishes is described in this four-page leaflet on the comparoscope. Pointing out that present-day methods of alloying metals and the closely controlled practice of heat treatment are designed to give the most suitable physical properties to the tools and implements of industry, the bulletin states that the ultimate assurance for the effectiveness of these properties is dependent upon the quality of finish imparted to the wear surfaces of the parts finally produced. This instrument evaluates and compares such surface finishes. It is a dual microscope, equipped with a master-stage and a base with an adjustable stage. Thus, it is possible to view and compare two surfaces simultaneously.

Mention R-398 When Writing or Using Reader Service.

Ceramic Filterscreen

Briggs Clarifier Co.,
1339 Wisconsin Ave., N.W., Washington 7, D. C.

Denser, stronger and defect-free castings of non-ferrous metals and their alloys may be made with the ceramic filterscreen described in this eight-page booklet. The filterscreen is a metal screen, covered with a special ceramic coating, through which molten metal is poured into the mold. It will resist extreme heat shock of molten metal at pouring temperatures up to 2500° F. It retains dross from molten metal, minimizing casting defects. In many cases, it permits elimination of special gates. It makes possible an even and controlled flow of metal, reduces splashing and dross formation. It also acts as a separator or parting agent between riser or gate and casting, in that the riser or gate may be knocked off with hammer blow when metal has cooled, saving as much as 10 to 15 min. normally taken to saw off the riser.

Mention R-399 When Writing or Using Reader Service.

Aluminum Rolling Mill Products

Fairmont Aluminum Co., Fairmont, W. Va.

Handsome and beautifully illustrated 48-page booklet describes aluminum products, production and advisory facilities; gives such useful information as gages and weights, commercial thickness tolerances for sheet and plate and strip sheet, physical properties, mechanical properties, specifications, conversion tables, etc. Company operates a modern rolling mill plant for production of aluminum plate, flat sheet, strip, flattened strip and circles in the alloys known as 2S, 3S and 52S. Plant is equipped with chemical and mechanical laboratories for the proper quality control of all operations. Manufacturing operations and the general offices constitute a single unit, and because of a closely coupled organization they are peculiarly adapted to provide expeditious service on smaller orders and expert personal supervision on orders of larger quantities.

Mention R-400 When Writing or Using Reader Service.

Tool Steels and Forgings

McInnes Steel Co., Corry, Pa.

A 20-page catalog of tool steels and forgings gives applications, analyses, hardening and tempering temperatures to give specific Rockwell hardness. Also presented are the standard classifications of high speed and tool steel extras.

Mention R-401 When Writing or Using Reader Service.

Cutting Electrodes

Ellwood Products Corp., Ellwood City, Pa.

A new bulletin on Ellpro cutting electrodes, for underwater or surface cutting, has just been published. These cutting electrodes were developed by Ellwood engineers and the U. S. Naval Experimental Station at Annapolis. With the end of the war, the possibilities for Ellpro cutting electrodes in harbor clearance, salvage and certain construction operations can now be revealed.

Ellpro cutting electrodes can be used with any portable welding set by simply adding a tank of oxygen. Their use underwater results in expert, speedy, safe, inexpensive cutting at depths up to 280 ft. and more.

For surface work, the electrodes have been found extremely efficient for cutting cast iron and other materials. There is no need for preheating; the cutting action starts instantly in water or air by striking the arc. The cutting speed is usually three times faster than possible by previous conventional methods. No experience is needed.

The new bulletin on Ellpro cutting electrodes gives complete details and specifications, together with a fully illustrated description on how to use the electrodes. The bulletin also describes the Palmgren arc oxygen kit for underwater cutting, used with Ellpro cutting electrodes.

Mention R-402 When Writing or Using Reader Service.

Power Hammer

McKiernan-Terry Corp.,
Park Row Bldg., New York 7, N. Y.

"The Mechanical Blacksmith's Helper" is the sub-title of a new bulletin describing the McKiernan-Terry Blacker power hammer. This sub-title aptly explains the purpose for which this direct-geared electric-power-driven hammer is intended—to enable one smith alone to handle any hand forging operation without helpers.

The bulletin gives detailed description of the hammer's design and construction with its specifications, supplemented by a concise tabulated list of the advantages and savings claimed for it. Photographic views of the hammer in several positions are shown. A section devoted to installation and operation shows a complete, characteristic set of anvil tools, all of which may be made by the smith himself using the Blacker hammer.

A complete list of the hammer's component parts accompanies four clear sectional drawings showing the parts numbered to correspond to the list. Instructions for installation and lubrication are included, also an impressive list of representative users, occupying a full page.

Mention R-403 When Writing or Using Reader Service.

Dust Control Equipment

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

Just off the press is Bulletin No. 310 on Multi-Wash equipment for the control of dust fumes and odors. This bulletin presents the advantages of the wet method originated by Schneible, including low operating and maintenance costs of the equipment employed, as well as the thorough removal of dust, fumes and odors from the collected air.

It contains illustrations and descriptions of the various Schneible units: Multi-Wash dust collectors, settling and dewatering equipment of various types, Schneible "Wear-proof" sludge pumps, entrainment separators, and a portable, self-contained dust and fume collection system embodied in one compact unit. Bulletins giving complete information on these various equipments are offered.

Many installations are shown in Bulletin 310. An interesting page contains the names of users of Schneible Multi-Wash equipment.

Mention R-404 When Writing or Using Reader Service.

Phosphor Bronze Electrode

Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 4, Wis.

A new bulletin describing Phos-Trode, a shielded arc, phosphor bronze welding electrode, has just been issued. Bulletin W-7 is well illustrated with views of typical welds and tests, contains weld deposit physical properties, recommended amperage, welding procedure and a list of typical applications.

Some of the features of Phos-Trode electrodes are low spatter loss, spray type arc action, superior bead contour, dense deposits free from porosity, excellent physical properties and shielded arc characteristics—good manipulation with short arc. They are suitable for d.c. welding on cast iron, malleable iron, steel, bronze, and brass.

Mention R-405 When Writing or Using Reader Service.

Non-Ferrous Melting

Ajax Electrothermic Corp., Trenton 5, N. J.

A 16-page Bulletin, No. 26, describes high speed, precision melting of non-ferrous metals in Ajax-Northrup induction furnaces. Both lift-coil and tilting-coil types of furnaces are illustrated and fully described, in sizes from 120 lb. capacity up, powered by efficient motor-generator units from 50 kw. up. Smaller furnaces are described in other bulletins. Of particular value are helpful hints in planning an efficient foundry, and a table showing proper equipment to maintain any given production schedule with red brass, copper, yellow brass, aluminum, magnesium, gold, or silver.

Mention R-406 When Writing or Using Reader Service.

Machine Shop Terms

Kropp Forge Co., 5301 W. Roosevelt Rd., Chicago 50, Ill.

Machine shop terminology as it applies to the machining of forgings has long been a subject which required clarification. To this end, Kropp Forge has compiled and published a convenient 32-page booklet, the "Glossary of Machine Shop Terms".

This glossary is of practical aid to buyers and users of machined forgings. Words and terms are defined as used in heavy machine shop practice, and recognition is given the fact that other definitions are sometimes employed in various industries for describing identical processes or operations.

Mention R-407 When Writing or Using Reader Service.

Tool Bits

Vanadium-Alloys Steel Co., Latrobe, Pa.

New booklet describing complete line of high speed tool bits and Lamite cutting tools has just been published. According to Vanadium-Alloys, this line provides the user with a tool bit service designed to meet practically every cutting problem.

The first section of the bulletin is designed to simplify the selection of the proper high speed steel bit for any application, and includes descriptions of Vanadium's Red Cut Superior, 6-6-2, E.V.M., Red Cut Cobalt, Gray Cut Cobalt, Neatro, Victory Cobalt, and Vasco M-2.

The second section gives complete details on Lamite cast alloy cutting tools. Lamite cast alloy is of the cobalt-chromium-tungsten type which contains no iron and requires no heat treatment. Square and flat tool bits of standard size are available for prompt delivery in the finished ground condition. Included in this section on Lamite is complete information on grinding Lamite tools.

The bulletin also lists the Vanadium-Alloys warehouses, district offices, and mill warehouses and works.

Mention R-408 When Writing or Using Reader Service.

Thermocouple Data Book

Wheelco Instruments Co.,
Harrison & Peoria Sts., Chicago 7, Ill.

New 32-page edition of Thermocouple Data Book and Catalog is designated Bulletin S2-6; it gives information on selection of proper thermocouples and carries installation aids. It describes and lists prices and recommendations on thermocouples, thermocouple wire, lead wire, heads, connectors, plug and socket assemblies, insulators, and protecting tubes.

Mention R-409 When Writing or Using Reader Service.

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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